

*Faculty, Adjunct professors, Research scientists,
Visiting scientists, Lecturers, PhD students, Post-doc
and Staff
at the Pescara Center
December 2021*

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ICRANet Faculty Staff

Barres de Almeida, Ulisses	CBPF, Rio de Janeiro, Brazil
Belinski, Vladimir	ICRANet
Bianco, Carlo Luciano	ICRANet and Università di Roma "Sapienza"
Cherubini, Christian	ICRANet and University Campus Bio-medico, Italy
Damour, Thibault	IHES, France
Della Valle, Massimo	INAF-Napoli - Osservatorio Astronomico di Capodimonte, Italy
Filippi, Simonetta	ICRANet and University Campus Bio-medico, Italy
Giommi, Paolo	ASI Science Data Centre, Italy
Jantzen, Robert	AbrahamTaub-ICRANet Chair and Villanova University, USA
Kerr, Roy P.	Yevgeny Mikhajlovic Lifshitz - ICRANet University of Canterbury, New Zeland
Li, Liang	ICRANet
Moradi, Rahim	ICRANet
Punsly, Brian Mathew	Mathew California University, Los Angeles USA
Rueda, Jorge A.	ICRANet and Università degli Studi di Ferrara
Ruffini, Remo	ICRANet and Università di Roma "Sapienza"
Sahakyan, Narek	ICRANet-Yerevan, Armenia
Vereshchagin, Gregory	ICRANet
Wang, Yu	ICRANet
Xue, She Sheng	ICRANet

Adjunct Professors of the Faculty

Aimuratov, Yerlan	Fesenkov Astrophysical Institute, Kazakhstan
Ansoldi, Stefano	University of Udine, Italy
Argüelles, Carlos	CONICET, Argentina
Barres de Almeida, Ulisses	CBPF, Rio de Janeiro, Brazil
Becerra Bayona, Laura Marcela	Universidad Católica de Chile, Chile
Bini, Donato	CNR, Italy
Buchert, Thomas	Centre de Recherche Astrophysique de Lyon, UCBL1, ENS-L, CNRS, France
Camargo Rodrigues de Lima, Rafael	Universidade do Estado de Santa Catarina, Brazil
Chakrabarti, Sandip Kumar	Indian Centre for Space Physics, Kolkata, India
Cherubini, Christian	ICRANet and Campus Biomedico, Italy
Della Valle, Massimo	Osservatorio di CapodiMonte, Italy
Filippi, Simonetta	ICRANet and Campus Biomedico, Italy
Fisher, Robert	University of Massachusetts Dartmouth
Frontera, Filippo	University of Ferrara, Italy
Fryer, Chris L.	University of Arizona, Tucson, Arizona, USA
Giommi, Paolo	ASI, Italian Space Agency
Karlica, Mile	University of Nova Gorica, Slovenia
Kleinert, Hagen	Richard Feynmann - ICRANet Chair, Freie Universität Berlin
Kerr, Roy	Yevgeny Mikhajlovic Lifshitz - ICRANet Chair and University of Canterbury, New Zeland
Lee, Hyung Won	Inje University, South Korea
Mansouri, Reza	Sharif University of Technology

Mathews, Grant	University of Notre Dame
Merafina, Marco	University of Rome La Sapienza, Italy
Mirabel, Felix	CEA
Muccino, Marco	INFN
Pak-Hin, Tam	Sun Yat-Sen University, Guangzhou, China
Piran, Tsvi	Yuval Neeman-ICRANet Chair and the Hebrew University, Israel
Prakapenia, Mikalai	ICRANet-Minsk, Belarus
Punsly, Brian Mathew	Mathew California University, Los Angeles USA
Quevedo, Hernando	Institute of Nuclear Science, UNAM
Rodriguez Ruiz, José Fernando	Universidad Industrial de Santander
Shakeri, Soroush	Isfahan University of Technology, Iran
Sigismondi, Costantino	ICRA, Italy
Sobouti, Yousef	Institute for Advanced Studies in Basic Sciences, IASBS, Iran
Zen Vasconcellos, Cesar Augusto	UFRGS, Porto Alegre, RS, Brazil

Lecturers

Aksenov, Alexei	Institute for Theoretical and Experimental Physics
Alekseev, Georgy	Steklov Mathematical Inst- Russian Acad of Sciences
Bini, Donato	CNR and ICRANet, Italy
Chen, Pisin	National Taiwan University, Kavli Instit. Particle Astrophysics and Cosmology
Cherubini, Christian	Campus Biomedico, Rome, Italy
Jing, Yi-Peng	Shangai Astronomy Observatory
Lee, Chul Hoon	Hanyang University, Seoul, Korea
Lee, Hyun Kyu	Department of Physics, Hanyang University, Korea
Lou, You Qing	Tsinghua University, Beijing
Mester, John	Stanford University, USA
Ohanian, Hans	Rensselaer Polytechnic Institute, New York, USA
Pacheco, José	Observatoire de la Côte d'Azur, Nice, France
Perez Bergliaffa, Santiago	Univesidade do Estado de Rio de Janeiro, Brasil
Pucacco Giuseppe	Università di Tor Vergata, Rome, Italy
Sang Pyo Kim	Kunsan National University, Korea
Sepulveda, Alonso	University of Antioquia, Columbia
Song Doo Jong	Korea Astronomy and Space Science Institute, South Korea
Starobinsky, Alexei	Landau Institute for Theoretical Physics, Russia
Sung-Won Kim	Institute of Theoretical Physics for Asia-Pacific, Korea
Wiltshire David	University of Canterbury, New Zealand

Research Scientists

Benetti, Micol	ICRANet
Bernardini, Maria Grazia	ICRANet and Università di Roma "Sapienza", Italy
Lattanzi, Massimiliano	University of Oxford and ICRANet
Patricelli, Barbara	ICRANet and Università di Roma "Sapienza", Italy
Rotondo, Michael	ICRANet and Università di Roma "Sapienza", Italy

Visiting Scientists

Abishev, Medeu	Al-Farabi Kazakh National University, Kazakhstan
Ahmedov, Bobomurat	Uzbekistan Academy of Sciences
Alfonso Pardo, Wilmer Daniel	Universidad de Antioquia Medellín, Antioquia, Colombia
Ansoldi, Stefano	University of Udine, Italy
Arkhangelskaya, Irene	Moscow Engineering Physics Institute, Russia
Bakytzhan, Zhami	Al-Farabi Kazakh National University, Kazakhstan
Batebi, Saghar	Isfahan University of Technology, Iran
Bavarsad, Ehsan	Isfahan University of Technology, Iran
Belczynski, Chris	Nicolaus Copernicus Astronomical Center, Poland
Bernal, Cristian Giovanny	Universidad Nacional Autónoma de México (UNAM), Mexico
Blinne, Alexander	University Jenna, Germany
Boçi, Sonila	University of Tirana, Albania
Boshkayev, Kuantay	Al-Farabi Kazah National University, Kazakhstan
Cadez, Andrej	University of Ljubljana, Slovenia
Cho, Yongmin	UNIST
Corvino, Giovanni	University of Rome La Sapienza, Italy
Da Cunha, Bruno Carneiro	UFPE, Brazil
Davis, Stanley	Université Bordeaux, France
De Lorenci, Vitorio	Federal University Of Itajuba - Brazil
Eslamzadeh Askestani, Sareh	University of Mazandaran, Iran
Ewald, Denise Grüne	Universidade Federal do Rio Grande do Sul, Brazil
Fimin, Nicolaj	Keldish Institute for Applied Mathematics, Russia

Gadri, Mohamed	University of Tripoli, Libya
Gallego Cadavid, Alexander	Universidad de Antioquia Medellín, Antioquia, Colombia
Goulart, Erico	Centro Brasileiro de Pesquisas Físicas, Brazil
Guzzo, Marcelo Moraes	Universidade Estadual de Campinas, Brazil
Haghighat, Mansour	Isfahan University of Technology, Iran
Hoang, Ngoc-Long	IPE, Hanoi, Vietnam
Hütsi, Gert	Tartu Observatory, Estonia
Kenesbek, Zhadyra	Al-Farabi Kazakh National University, Kazakhstan
Kilin, Sergei	National Academy of Sciences of Belarus
Kim, Hongsu	KASI
Kim, Hyeong-Chan	Chungju National University
Kim, Hyuong Yee	INJE, South Korea
Kim, Jin Young	Kunsan National University
Kim, Sang Pyo	Kunsan National University, Republic of Korea
Lecian, Orchidea Maria	Sapienza University of Rome, Italy
Lee, Chang-Hwan	Pusan National University
Lee, Hyung Won	Inje University
Lee, Wonwoo	Cquest, Sogang University
Lin, Wenbin	Southwest Jiaotong University, Chengdu, China
Mahmoudikooshkeqazi, Somayyeh	Shiraz University, Iran
Malheiro, Manuel	ITA, Brazil
Mansouri, Reza	Sharif University of Technology, Iran
Mathews, Grant	University of Notre Dame, USA

Modaresvamegh, Saeidehalsadat	Shiraz University, Iran
Mohammadi, Rohollah	Isfahan University of Tecnology, Iran
Moliné, Maria de los Angeles	Instituto de Astrofísica e Ciências do Espaço, Lisboa
Mosquera Cuesta, Herman	Instituto Federal de Educação, Ciência e Tecnologia do Ceará, Brazil
Motie, Iman	Isfahan University of Technology, Iran
Muhsin Burhan Mohammed Rashid Al-Jaf	University of Science and Technology of China - Hefei
Nagataki, Shigehiro	Yukawa Institute for Theoretical Physics, Kyoto University
Nessipbay, Aizhan	Al-Farabi Kazakh National University, Kazakhstan
Pak-Hin, Tam	Sun Yar-Sen University, China
Pakhshan, Espoukeh	Azad University
Park, Ilhung	Ieu, Ewha Womans University
Park, Myeong-Gu	Kyungpook National University
Passiltay, Ainur	Al-Farabi Kazakh National University, Kazakhstan
Paudel, Rishiram	Tribhuvan University, Central Department of Physics
Peqini, Klaudio	University of Tirana, Albania
Peres Menezes, Débora	Universidade Federal de Santa Catarina, Brazil
Peresano, Michele	University of Udine, Italy
Perez Bergliaffa, Santiago	Universidade do Estado do Rio de Janeiro, Brazil
Perez Martinez, Aurora	Instituto de Cibernética Matemática Y Física, Cuba
Picanco Negreiros, Rodrigo	Universidade Federal Fluminense, Brazil
Piechocki, Włodzimierz	Institute for Nuclear Studies - Poland
Pinto Neto, Nelson	Centro Brasileiro de Pesquisas Físicas, Brazil
Prakapenia, Mikalai	B.I. Stepanov Institute of Physics, NASB, ICRANet- Minsk

Qadir, Ashgar	National University of Sciences and Technology - Pakistan
Rafelski, Johann	University of Arizona
Raffaelli, Bernard	Université de Corse, France
Riahi, Rashid	Isfahan University of Technology, Iran
Romano, Antonio Enea	Universidad de Antioquia Medellín, Antioquia, Colombia
Romero, Gustavo E.	Instituto Argentino de Radioastronomía IAR- CONICET, Argentina
Rybak, Ivan	Centro de Astrofísica da Universidade do Porto, Portugal
Sasaki, Misao	Kyoto University, Japan
Shakeri, Soroush	Isfahan University of Technology, Iran
Soares Maia, Clovis Achy	Universidade de Brasília, DF, Brazil
S. O. Kepler	Universidade Federal do Rio Grande do Sul, Brazil
Tahvildarzadeh, Abdolreza	Rutgers, the State University of New Jersey, USA
Tarasenko, Aleksander	Belarusian State University
Teixeira Coelho, Hélio	Universidade Federal de Pernambuco, Brazil
Tkachenko, Alessya	Al-Farabi Kazakh National University, Kazakhstan
Torres, Sergio	Centro Internacional de Física, Bogotá, Colombia
Torrieri, Donato Giorgio	Universidade Estadual de Campinas, Brazil
Tizchang, Seddigheh	Isfahan University of Technology, Iran
Vallejo Peña, Sergio Andrés	Universidad de Antioquia Medellín, Antioquia, Colombia
Van Putten, Maurice	Korean Institute for Advanced Study, South Korea
Vyblyi, Yuri	B.I. Stepanov Institute of Physics, Republic of Belarus
Yang, Jongmann	Ieu, Ewha Womans University
Yeom, Dong-Han	Cquest, Sogang University

Zalaletdinov, Roustam	Dept. of Theoretical Physisc, Institute of Nuclear Physics, Uzbek Acadeny of Sciences, Uzbekistan
Zheng, Yunlong	University of Science and Technology of China
Zhumabayeva, Symbat	Al-Farabi Kazakh National University, Kazakhstan
Zurab, Berezhiani	University of L'Aquila

International Relativistic Astrophysics Ph. D

First Cycle 2002-2005
Peirani, Sebastien France

Second Cycle 2003-2006
Bernardini, Maria Grazia Italy
Mattei, Alvisé Italy
Mercuri, Simone Italy

Third Cycle 2004-2007
Chiappinelli, Anna France
Cianfrani, Francesco Italy
Guida, Roberto Italy
Rotondo, Michael Italy
Yegorian, Gegham Armenia
Vereshchagin, Gregory Belarus

Fourth Cycle 2005-2008
Battisti, Marco Valerio Italy
Dainotti, Maria Giovanna Italy
Khachatryan, Harutyun Armenia
Lecian, Orchidea Maria Italy
Pizzi, Marco Italy
Pompi, Francesca Italy

Fifth Cycle 2006-2009
Caito, Letizia Italy
De Barros, Gustavo Brazil
Minazzoli, Olivier Switzerland
Patricelli, Barbara Italy
Rangel Lemos, Luis Juracy Brazil
Rueda Hernandez, Jorge Armando Colombia

Sixth Cycle 2007-2010
Ferroni, Valerio Italy
Izzo, Luca Italy
Kanaan, Chadia
Pugliese, Daniela Italy
Sigismondi, Costantino Italy
Siutsou, Ivan Belarus

Seventh Cycle 2008-2011
Belvedere, Riccardo Italy
Ceccobello, Chiara
Ferrara, Walter Italy

Han, Wen-Biao	China
Luongo, Orlando	Italy
Pandolfi, Stefania	Italy
Taj, Safia	Pakistan
<i>Eighth Cycle</i>	<i>2009-2012</i>
Boshkayev, Kuantay	Kazakhstan
Bravetti, Alessandro	Italy
Haney, Maria	Germany
Lombardi, Caterina Antonietta	Italy
Menegoni, Eloisa	Italy
Sahakyan, Narek	Armenia
Sahini, Sahil	India
<i>Ninth Cycle</i>	<i>2010-2013</i>
Arguelles, Carlos	Argentina
Benetti, Micol	Italy
Muccino, Marco	Italy
<i>Tenth Cycle</i>	<i>2011-2014</i>
Cáceres Uribe, Diego Leonardo	Colombia
Wang, Yu	China
<i>Eleventh Cycle</i>	<i>2012-2015</i>
Barbarino, Cristina	Italy
Cipolletta, Federico	Italy
Dichiara, Simone	Italy
<i>Twelfth Cycle</i>	<i>2013-2016</i>
Becerra, Laura	Colombia
Harutyunyan, Vahagn	Armenia
<i>Thirteenth Cycle</i>	<i>2014-2017</i>
Moradi, Rahim	Iran
Rodriguez Ruiz, Jose Fernando	Colombia
<i>Fourteenth Cycle</i>	<i>2015-2018</i>
Melon Fuksman, J. David	Argentina
Primorac, Daria	Croatia
Uribe S., Juan D.	Colombia
<i>Fifteenth Cycle</i>	<i>2016-2019</i>
Baghmanyanyan, Vardan	Armenia
Bedić, Suzana	Croatia
Campion, Stefano	Italy
Chen, Yen-Chen	Taiwan
Gasparyan, Sargis	Armenia
Marongiu, Marco	Italy

Martone, Renato	Italy
Vieira Lobato, Ronaldo	Brazil
Zargaryan, Davit	Armenia

<i>Sixteenth Cycle</i>	<i>2017-2020</i>
Becerra Vergara, Eduar Antonio	Colombia
Carinci, Massimo Luca Emiliano	Italy
Prakapenia, Mikalai	Belarus
Yunis, Rafael Ignacio	Argentina

IRAP Ph. D. Erasmus Mundus Students

<i>First Cycle</i>	<i>2010-2013</i>
Baranov, Andrey	Russia
Benedetti, Alberto	Italy
Dutta, Parikishit	India
Fleig, Philipp	Germany
Gruber, Christine	Austria
Liccardo, Vincenzo	Italy
Machado De Oliveira Fraga, Bernardo	Brazil
Martins De Carvalho, Sheyes	Brazil
Penacchioni, Ana Virginia	Argentina
Valsan, Vineeth	India

<i>Second Cycle</i>	<i>2011-2014</i>
Begue, Damien	France
Dereli, Husne	Turkey
Gregoris, Daniele	Italy
Iyyani, Shabnam Syamsunder	India
Pereira, Jonas Pedro	Brazil
Pisani, Giovanni	Italy
Rakshit, Suvendu	India
Sversut Arsioli, Bruno	Brazil
Wu, Yuanbin	China

<i>Third Cycle</i>	<i>2012-2015</i>
Bardho, Onelda	Albania
Enderli, Maxime	France
Filina, Anastasia	Russia
Galstyan, Irina	Armenia
Gomes De Oliveira, Fernanda	Brazil
Khorrami, Zeinab	Iran
Ludwig, Hendrik	Germany
Sawant, Disha	India
Strobel, Eckhard	Germany

<i>Fourth Cycle</i>	<i>2013-2016</i>
Ahlén, Olof	Sweden
Gómez Diaz, Gabriel	Colombia
Kovacevic, Milos	Serbia
Li, Liang	China
Lisakov, Sergey	Russia
Maiolino, Tais	Brazil
Sridhar, Srivatsan	India
Stahl, Clément	France
Yang, Xiaofeng	China

Fifth Cycle

Aimuratov, Yerlan

Chang, Yu-Ling

Delgado, Camilo

Efremov, Pavel

Karilca, Mile

Krut, Andreas

Martinez Aviles, Gerardo

2014-2017

Kazakhstan

Taiwan

Colombia

Russia

Croatia

Germany

Mexico

CAPES Students

First Cycle

Brandt Carlos Henrique

Guimarães Carvalho Gabriel

Pereira Lobo Iarley

2013-2016

Brazil

Brazil

Brazil

Administrative and Secretarial Staff

ICRANet - Pescara

Adamo, Cristina

Administrative Office

Brandolini, Gabriele

System Manager

Di Domizio, Yasmina

Secretariat

Di Niccolo, Cinzia

Secretariat

Latorre, Silvia

Administrative Office

Natale, Elisabetta

Secretariat

ICRANet Faculty Staff

Bianco Carlo Luciano

Position: ICRANet Faculty staff
Member of ICRANet Scientific Committee
Member of IRAP-PhD Faculty

Period covered: 2005 – 2021



I Scientific Work

Research on: Gamma-Ray Bursts, Relativistic astrophysics, Cosmology.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Gave the following invited lectures:

- C.L. Bianco, M.G. Bernardini, P. Chardonnet, F. Fraschetti, R. Ruffini, S.-S. Xue; Our model for Gamma-Ray Bursts; *1st Bego scientific rencontre*, Université de Nice Sophia-Antipolis, Nice, France, 14 February 2006.
- C.L. Bianco; Equations of motion and beaming in Gamma – Ray Bursts; *1st Cesare Lattes Meeting*, Mangaratiba (RJ), Brazil, 1 March 2007.
- C.L. Bianco, M.G. Bernardini, L. Caito, M.G. Dainotti, R. Guida, R. Ruffini; Theoretical interpretation of GRB060614; *2007 April Meeting of the American Physical Society*; Jacksonville, Florida (USA), 14 April 2007.
- C.L. Bianco; The fireshell model and the canonical GRB scenario; *Scuola Nazionale di Astrofisica (National School of Astrophysics)* (II course, IX cycle); Venice (Italy), 18 September 2007.
- C.L. Bianco, M.G. Bernardini, L. Caito, M.G. Dainotti, R. Guida, R. Ruffini, G. Vereshchagin, S.-S. Xue; Equations of motion of the fireshell; *3rd Stueckelberg Workshop*; Pescara (Italy), 10 July 2008.
- C.L. Bianco, M.G. Bernardini, L. Caito, G. De Barros, L. Izzo, F.A. Massucci, B. Patricelli, R. Ruffini, G. Vereshchagin, S.-S. Xue; The fireshell equations of motion and equitemporal surfaces; *6th Italian-Sino Workshop*; Pescara (Italy), 29 June 2009.
- C.L. Bianco, M.G. Bernardini, L. Caito, G. De Barros, L. Izzo, B. Patricelli, R. Ruffini; The canonical GRB scenario within the fireshell model: “long”, “genuine short” and “disguised short” GRBs; *GRB*

2010: *Dall'eV al TeV tutti i colori dei GRB – Secondo congresso italiano sui GRB*; Cefalù (Italy), 15 June 2010.

- A.G. Aksenov, M.G. Bernardini, C.L. Bianco, L. Caito, C. Cherubini, G. De Barros, A. Geralico, L. Izzo, F.A. Massucci, B. Patricelli, M. Rotondo, J.A. Rueda Hernandez, R. Ruffini, G. Vereshchagin, S.-S. Xue; New developments of the Fireshell scenario; *The Shocking Universe Meeting*, San Servolo, Venice (Italy), September 2009.
- C.L. Bianco, M.G. Bernardini, L. Caito, G. De Barros, L. Izzo, B. Patricelli, R. Ruffini; The fireshell equations of motion and the P-GRB observational properties; *2nd Galileo – Xu GuangQi meeting*, Ventimiglia (Italy), July 2010.
- C.L. Bianco, M.G. Bernardini, L. Caito, G. De Barros, L. Izzo, B. Patricelli, R. Ruffini; The fireshell model for GRBs: toward a canonical GRB scenario; *3rd Galileo – Xu GuangQi meeting*, Beijing (China), October 2011.

II b Work With Students

- Students of the IRAP-PhD program at University “La Sapienza”, Rome, Italy: Yerlan Aimuratov, Maria Grazia Bernardini, Letizia Caito, Maria Giovanna Dainotti, Gustavo De Barros, Maxime Enderli, Roberto Guida, Luca Izzo, Mile Karlika, Milos Kovacevic, J. David Melon Fuksman, Marco Muccino, Barbara Patricelli, Ana Virginia Penacchioni, Giovanni Battista Pisani, Daria Primorac, Luis Juracy Rangel Lemos, Yu Wang.
- Students of the First three years degree Thesis (“Tesi di Laurea triennale”) in Physics at University “La Sapienza”, Rome, Italy: Giulia De Rosi, Eliana La Francesca, Francesco Alessandro Massucci, Federica Volpi.
- Students of the Final Degree Thesis (“Tesi di Laurea Vecchio Ordinamento”) in Physics at University “La Sapienza”, Rome, Italy: Letizia Caito, Walter Ferrara, Laura Rosano.

II c Diploma thesis supervision

- 2005. External supervisor of the First three years degree thesis (“Tesi di laurea triennale”) in Physics by Francesco Alessandro Massucci at University “La Sapienza”, Rome, Italy.
- 2006. External supervisor of the Degree thesis in Physics by Letizia Caito at University “La Sapienza”, Rome, Italy.
- 2007. Thesis advisor of the IRAP-PhD Degree Thesis by Maria Grazia Bernardini at University “La Sapienza”, Rome, Italy.

- 2008. External supervisor of the First three years degree thesis (“Tesi di laurea triennale”) in Physics by Eliana La Francesca at University “La Sapienza”, Rome, Italy.
- 2008. Thesis advisor of the IRAP-PhD Degree Thesis by Roberto Guida at University “La Sapienza”, Rome, Italy.
- 2009. External supervisor of the Degree thesis in Physics by Laura Rosano at University “La Sapienza”, Rome, Italy.
- 2010. Thesis advisor of the IRAP-PhD Degree Thesis by Letizia Caito at University “La Sapienza”, Rome, Italy.
- 2010. External supervisor of the First three years degree thesis (“Tesi di laurea triennale”) in Physics by Giulia De Rosi at University “La Sapienza”, Rome, Italy.

II d Other Teaching Duties

- Assistant teacher in the course of “Laboratory of Electromagnetism and Circuits” by Prof. Giulio D’Agostini at Physics Department of the University “La Sapienza”, Rome, Italy, academical year 2005/2006.
- Assistant teacher in the course of “Laboratory of Systems and Signals” by Prof. Mario Mattioli at Physics Department of the University “La Sapienza”, Rome, Italy, academical years 2007/2008, 2008/2009, 2009/2010, 2010/2011, 2011/2012, 2012/2013.
- Assistant teacher in the course of “Laboratory of Systems and Signals” by Prof. Andrea Nigro at Physics Department of the University “La Sapienza”, Rome, Italy, academical years 2013/2014, 2014/2015, 2015/2016, 2016/2017.
- Assistant teacher in the course of “Laboratory of Systems and Signals” by Prof. Mauro Raggi at Physics Department of the University “La Sapienza”, Rome, Italy, academical years 2013/2014, 2014/2015, 2015/2016, 2016/2017, 2017/2018, 2018/2019.

III. Service activities

III a. Within ICRANet

- Administrator of the two servers used for numerical computations at ICRANet – Rome.
- Secretariat of the IRAP PhD.
- Member of the ICRANet Scientific Committee.
- Member of the IRAP PhD Faculty

III b. Outside ICRANet

- “Cultore della Materia” (“Expert of the subject”) for the “FIS/01 – Experimental Physics”, “FIS/02 – Theoretical Physics, Models and Mathematical Methods”, “FIS/05 – Astronomy and Astrophysics” scientific sectors in the Mathematical, Physical and Natural Sciences Faculty of the University of Rome “La Sapienza”.

IV. Other

2021 List of Publication

R. Ruffini, R. Moradi, J.A. Rueda, L. Li, N. Sahakyan, Y.-C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C.L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G.J. Mathews, M. Muccino, G.B. Pisani, S.-S. Xue; The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs; Monthly Notices of the Royal Astronomical Society, 504, 5301 (2021)

R. Moradi, J.A. Rueda, R. Ruffini, Liang Li, C.L. Bianco, S. Campion, C. Cherubini, S. Filippi, Y. Wang, and S.-S. Xue; Nature of the ultrarelativistic prompt emission phase of GRB 190114C; Phys. Rev. D, 104, 063043 (2021)

Cherubini Christian



Position: Associate Professor in Mathematical Physics (MAT/07).
Department of Science and Technology for Humans and the Environment
Laboratory of Nonlinear Physics and Mathematical Modeling
University “Campus Bio-Medico di Roma”,
Via A. del Portillo 21, I-00128 Rome, Italy
and
Adjunct Professor in ICRANet Faculty.

Period covered: position at ICRANet started on September 11th, 2017

I Scientific Work

- Electrodynamics and magnetohydrodynamics around black holes;
- Selfgravitating systems;
- Mathematical Biology.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Co-chairman of the parallel session on "Binary-Driven Hypernovae of type 1, 2 and 3" at the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).
- Talk with title “On Kerr black hole perfect MHD processes in Doran coordinates" in track "Strong Electromagnetic and Gravitational Field Physics: From Laboratories to Early Universe” of the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

In 2021 Prof. Cherubini has collaborated with Dr Moradi, Dr Rueda and several other ICRANet scientists on problems of electrodynamics around black holes and on self gravitating systems.

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

- Participation to the "Collegio di Dottorato" of the INTERNATIONAL RELATIVISTIC ASTROPHYSICS PH.D."

III b. Outside ICRANet

- Lecturer "Electromagnetism" (Departmental Faculty of Engineering, University Campus Bio-Medico of Rome).
- Lecturer "Mathematical Physics Models for Engineering" (Departmental Faculty of Engineering, University Campus Bio-Medico of Rome).
- Supplementary teaching for "Rational Mechanics Laboratory" (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).
- Lecturer "Mathematics" in the integrated course of Mathematics and Computer Science (Department of Science and Technology for Humans and the Environment, University Campus Bio-Medico of Rome).

IV. Other

Prof. Cherubini has a longstanding collaboration with other ICRANET scientists. In particular, in collaboration with Dr D. Bini, Prof. R. T Jantzen, Prof. R. Ruffini and Dr. J.A. Rueda, he has written several articles in various aspects of classical General Relativity. With Prof. S. Filippi he is involved in research activities in the fields of Stellar and Galactic self-gravitating Structures, Analogue models of Gravitation and Complex Systems in biophysics.

2021 List of Publications

- R. Moradi, J. A. Rueda, R. Ruffini, Liang Li, C. L. Bianco, S. Campion, C. Cherubini, S. Filippi, Y. Wang, and S. S. Xue, "Nature of the ultrarelativistic prompt emission phase of GRB 190114C", PHYSICAL REVIEW D 104, 063043 (2021).
- A. Loppini, A. Barone, A. Gizzi, C. Cherubini, F. H. Fenton, S. Filippi, "Thermal effects on cardiac alternans onset and development: A spatiotemporal correlation analysis", PHYSICAL REVIEW E 103, L040201 (2021)
- R. Ruffini, R. Moradi, J. A. Rueda, L. Li, N. Sahakyan, Y.-C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B. Pisani, and S. S. Xue, "The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs", MNRAS 504, 5301–5326 (2021).

Massimo Della Valle



Position: Director of Research, Capodimonte Astronomical Observatory, INAF-Naples

Scientific Work

Follow-up of Supernovae; Photometric and Spectroscopic Evolution, Rates

Supernova and Gamma-ray Burst connection

Galactic and extragalactic Novae

Supernovae-Ia and Gamma-ray Bursts as rulers for cosmological parameters

Kilonovae and short Gamma-ray Bursts

Brief description

My ongoing research concern the study of several classes of transient phenomena such as: Supernovae, Gamma-ray Bursts, Kilonovae and Novae.

Gamma-ray bursts and their Afterglows. My interest in this area

started in 2000 when I became member of the SWIFT follow-up team. Most efforts are devoted to the study of the connection between Supernovae and GRBs [1][3]. Their high energy follow-up has been studied in [4].

Supernovae. Photometric and the spectroscopic study of all types of SNe (Ia, Ib/c, II-linear, II-plateau) near maximum light and at late stages and their theoretical modeling. The observations at maximum provide us with the necessary data for using SNe (Ia and II) as standard candles. The observations at later stages allow one to discriminate among different energy sources (i.e. radioactive decay, pulsar, light-echo), to model the mechanisms of the explosion, and to shed light on the nature of the progenitor [5, 11]. The possibility to detect neutrinos and GWs from nearby events has been studied in [8] and [9].

Kilonovae. The study of kilonova rate associated with short GRBs (e.g. 179817A) has been carried out on theoretical and statistical grounds [13].

Novae. Classical and Recurrent Novae are objects of great interest because they are considered potential progenitors of SNe-Ia and important contributors to the Galactic nucleosynthesis [2, 6].

SN and GRB Cosmology.

Two important topics have been faced off:

- i) we have obtained a new calibration of the magnitude at maximum of SNe-Ia obtained via Surface Brightness distance indicator method [10]. We confirm the existence of a $\sim 3\sigma$ tension between PLANK and local distance indicators on the H_0 measurements.
- ii) we show on the basis of a new sample of GRBs that at $z \leq 1.2$ $w(z)$ agrees within 1σ with the standard value $w = -1$ (cosmological constant). The situation is different at larger z , where gamma-ray bursts suggest that $w(z)$ seems to deviate from $w = -1$ at 2σ and 4σ level, depending on the redshift bins [12] (admittedly this result is based on rather poor statistic).

2021 List of Publication

1.

The supernova of the MAGIC GRB190114C

Melandri, A.; Izzo, L.; Pian, E. and 42 more

2021arXiv211204759M

2.

Detection of ^7Be II in the Small Magellanic Cloud

Izzo, Luca; Molaro, Paolo; Cescutti, Gabriele and 8 more

2021 MNRAS.tmp.3442I

3.
Outflows from GRB hosts are ubiquitous: Kinematics of $z < 0.3$ GRB-SN hosts resolved with FLAMES
Thöne, C. C.; Izzo, L.; Flores, H. and 12 more
2021A&A...656A.136T

4.
Time domain astronomy with the THESEUS satellite
Mereghetti, S.; Balman, S.; Caballero-Garcia, M. and 74 more
2021ExA...tmp..143M

5.
Less than 1% of Core-Collapse Supernovae in the local universe occur in elliptical galaxies
Irani, I.; Prentice, S. J.; Schulze, S. and 40 more
2021arXiv211002252I

6.
Classical Novae: Galactic lithium factories?
Izzo, Luca; Aydi, Elias; Della Valle, Massimo and 6 more
2021hst..prop16745I

7.
Separating ^{39}Ar from ^{40}Ar by cryogenic distillation with Aria for dark-matter searches
Agnes, P.; Albergo, S.; Albuquerque, I. F. M. and 307 more
2021EPJC...81..359A

8.
Sensitivity of future liquid argon dark matter search experiments to core-collapse supernova neutrinos
DarkSide-20k Collaboration; Agnes, P.; Albergo, S. and 274 more
2021JCAP...03..043D

9.
Lunar Gravitational-wave Antenna
Harms, Jan; Ambrosino, Filippo; Angelini, Lorella and 55 more
2021ApJ...910....1H

10.
A new measurement of the Hubble constant using Type Ia supernovae calibrated with surface brightness fluctuations
Khetan, Nandita; Izzo, Luca; Branchesi, Marica and 15 more
2021A&A...647A..72K

- 11.

SN 2019muj - a well-observed Type Iax supernova that bridges the luminosity gap of the class
Barna, Barnabás; Szalai, Tamás; Jha, Saurabh W. and 38 more

2021MNRAS.501.1078B

12.

Tracing Dark Energy History with Gamma-Ray Bursts

Muccino, M.; Izzo, L.; Luongo, O. and 5 more

2021ApJ...908..181M

13.

Predicted rates of merging neutron stars in galaxies

Molero, Marta; Simonetti, Paolo; Matteucci, Francesca and 1 more

2021MNRAS.500.1071M



Filippi Simonetta

Position: Full Professor in Theoretical Physics (FIS/02)
Departmental Faculty of Engineering
University Campus Bio-Medico of Rome,
Head, Laboratory of Nonlinear Physics and Mathematical Modeling
Via A. del Portillo 21, I-001285 Rome, Italy,
Tel. +39-06-225419611
and
Adjunct Professor in ICRANet Faculty.

Period covered: position at ICRANet started on September 12th 2017

I Scientific Work

- Electrodynamics around black holes and self-gravitating systems.
- Theoretical biophysics.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Co-chairman of the parallel session on "Binary-Driven Hypernovae of type 1, 2 and 3" at the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).
- Coauthor of the talk with title "On Kerr black hole perfect MHD processes in Doran coordinates" in track "Strong Electromagnetic and Gravitational Field Physics: From Laboratories to Early Universe" of the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

In 2021 Prof. Filippi has collaborated with Dr Rueda, Dr Moradi and other ICRANet scientists studying the electrodynamics around black holes and some features of classical self gravitating systems.

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

Prof. Filippi serves as supervisor for IRAP PhD students.

Member of the Final Exam Commission for PhD doctoral thesis of Yen-Chen CHEN (enrolled in the 32° Sapienza cycle - XV IRAP of the Doctorate).

III b. Outside ICRANet

- Lecturer “Dynamics of Complex Systems” (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).
- Lecturer “Rational Mechanics Laboratory” (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).
- Faculty of the “Science and Engineering for Humans and the Environment PH.D “ by University Campus Bio-Medico of Rome.

- IV. Other

Prof. Filippi has a longstanding collaboration with ICRANET scientists. In particular, in collaboration with Prof. Remo Ruffini she has written several articles on various aspects of Gravitational Physics with a specific focus in classical figures of equilibrium. With Prof. Christian Cherubini, Dr Jorge Rueda, Dr Andrea Geralico and Dr Donato Bini she has been involved in research activities in the fields of Stellar and Galactic Structures, Analogue gravity models and Complex Systems in biological systems.

2021 List of Publications

- R. Moradi, J. A. Rueda, R. Ruffini, Liang Li, C. L. Bianco, S. Campion, C. Cherubini, S. Filippi, Y. Wang, and S. S. Xue, "Nature of the ultrarelativistic prompt emission phase of GRB 190114C", PHYSICAL REVIEW D 104, 063043 (2021).
- A. Loppini, A. Barone, A. Gizzi, C. Cherubini, F. H. Fenton, S. Filippi, "Thermal effects on cardiac alternans onset and development: A spatiotemporal correlation analysis", PHYSICAL REVIEW E 103, L040201 (2021)
- R. Ruffini, R. Moradi, J. A. Rueda, L. Li, N. Sahakyan, Y.-C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B. Pisani, and S. S. Xue, "The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs", MNRAS 504, 5301–5326 (2021).

Liang Li

Position: Researcher

Period covered: 2018 - present

I Scientific Work

Education

2013.09-2018.02 Stockholm University (Sweden) Astrophysics (Ph.D.)

2009.09-2012.06 Guangxi University (China) Theoretical Physics (M.S.)

2005.09-2009.06 Sichuan Normal University (China) Physics (B.S.)

Work Experience

2012.09-2013.08 Research Assistant: Department of Physics and GXU-NAOC Center for Astrophysics and Space Sciences, Guangxi University, China. Assisted the supervisor to do scientific research.

2018.03-now Researcher: International Center for Relativistic Astrophysics Network (ICRANet), Pescara, Italy

II Conferences and educational activities

II a Conferences and Other External Scientific Work

02-06 August 2021 17th Italian-Korean Meeting, Pescara, Italy, 30 minutes oral presentation

03-07 November 2021 ICRANet-Isfahan Astronomy, Isfahan (virtual), 30 minutes oral presentation

05-1 July 2021 16th Marcel Grossmann Meeting, Rome, Italy (virtual), 30 minutes oral presentation

11-07 September 2020 The Fourth Zeldovich Virtual Meeting, half hour oral presentation (virtual)

16-19 September 2019 RAGtime 21 Meeting, Opava, Czech Republic, half hour oral presentation

01-05 July 2019 16th Italian-Korean Meeting, Pescara, Italy, one hour oral presentation

13-17 May 2019 2019 Nanjing GRB Conference, Nanjing, China, 15 minutes oral presentation

25-30 June 2017 The Fifth Galileo-Xu Guanggi Meeting, Chengdu, China

20-27 July 2015 14th Italian-Korean Meeting, Pescara, Italy, 20 minutes oral presentation

12-19 July 2015 14th Marcel Grossmann Meeting, Rome, Italy

16-19 June 2014 Gamma-Ray Bursts in the Multi-Messenger Era, Paris, France

01-07 July 2013 The Eighth Jingguangxia Astrophysical Seminar, China, 15 minutes oral presentation

06-10 May 2013 2013 Multi-Messenger Transient Astrophysics Workshop KIAA, Beijing

27-31 July 2012 The Sixth Gamma-Ray Burst and other Explosive Astrophysical Seminar (organizer), 15 minutes oral speech

01-03 January 2012 The Seventh Jingguangxia Astrophysical Seminar, Xiamen University, Xiamen, China, 20 minutes oral presentation

30 Oct-03 Nov 2011 The Chinese Astronomical Society Annual Meeting 2011, a 12 minutes report

22-25 August 2011 The Fifth Gamma-ray Bursts and other Explosive Astrophysical Seminar, a 15-minute report

20-24 April 2011 The Sixth Black Hole Astrophysical Annual Conference (organizer), 20 minutes oral presentation, China

31 Oct-5 Nov 2010 The Chinese Astronomy Annual Meeting 2010, 15 minutes oral report

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

Honors and Awards

2016.09-2018.01 Stockholm University Ph.D. Scholarship

2013.09-2016.08 Erasmus Mundus Joint Doctorate Program Scholarship

2009.09-2012.06 Graduate Sponsorship

2021 List of Publication

UNDER REVIEW PAPERS

1. F. Rastegar Nia, J. A. Rueda, R. Ruffini, **Liang Li**[Corresponding Author], R. Moradi, and Yu. Wang, “GRB 180720B: From ultrarelativistic emission phase to afterglow emission”, *Monthly Notices of Royal Astronomical Society*, [arXiv], Under review, [Journal Article].
2. Gregory Vereshchagin, **Liang Li**[Corresponding Author], and Damien Begue, “Is magnetically dominated outflow required to explain GRBs?”, *Monthly Notices of Royal Astronomical Society*,

[arXiv:2201.05062], [Journal Article].

3. J. A. Rueda, R. Ruffini, **Liang Li**[Corresponding Author], R. Moradi, N.Sahakyan, “A binary white dwarf merger scenario for GRB 170817A”, *Monthly Notices of Royal Astronomical Society*, [arXiv], Under review, [Journal Article].

4. M.G. Dainotti, S. Young, **L. Li**[Corresponding Author], D. A. Kann, L. Zambrano-Tapia, H. T. Tso, A. Zambrano-Tapia, B. Cenko, M. Fuentes, K. K. Kalinowski, E. G. Sánchez-Vázquez, S. Oates, N. Fraija, N. Osborn, R. L. Becerra, A. M. Watson, N. R. Butler, J. J. González, A. S. Kuttyrev, W. H. Lee, J. X. Prochaska, E. Ramirez-Ruiz, and M. G. Richer, “The Optical Two and Three-Dimensional Fundamental Plane Correlations for More than 180 Gamma-Ray Burst Afterglows with Swift/UVOT, RATIR, and the SUBARU Telescope”, 2021, *The Astrophysical Journal Letters*, Under review, [arXiv], [Journal Article].

5. R. Moradi, **Liang Li**[Corresponding Author], R. Ruffini, J.A. Rueda, N.Sahakyan, and Y. Wang, “X-ray and GeV afterglows and sub-TeV emission of GRB 180720B”, *The Astrophysical Journal*, [arXiv:2103.09158], Under review, [Journal Article].

6. **Liang Li**, R. Ruffini, J.A. Rueda, R. Moradi, Y. Wang, and S.S. Xue, “Self-Similarities and Power-laws in the Time-resolved Spectra of GRB 190114C, GRB 130427A, GRB 160509A, and GRB 160625B”, *Astronomy & Astrophysics*, Under review, [arXiv:1910.12615], [Journal Article].

7. R Ruffini, **Liang Li**[Corresponding Author], R Moradi, J.A.Rueda, Yu Wang, S.S.Xue, C.L.Bianco, S.Campion, J.D.Fuksman, C.Cherubini, S.Filippi, M.Karlica, N.Sahakyan, “Selfsimilarity and Power-laws in GRB 190114C”, Under review, [arXiv:1904.04162], [Journal Article].

8. Yu Wang, **Liang Li**[Corresponding Author], Rahim Moradi, and Remo Ruffini, “GRB 190114C: A Gamma-ray Burst of Many faces”, Under review, [arXiv:1901.07505], [Journal Article].

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2. REFEREED PAPERS (FIRST AUTHOR, CORRESPONDING AUTHOR, AND CO-AUTHOR PUBLICATIONS)

1. Fan Xu, Jin-Jun Geng, Xu Wang, **Liang Li**, and Yong-Feng Huang, “Is the Birth of PSR J0538+2817 Accompanied by a Gamma-ray Burst?”, *Monthly Notices of Royal Astronomical Society*, [arXiv:2109.11485], in press, [Journal Article].
2. **Liang Li**, “Standard GRB Spectral Models Misused”, 2021, *The Astrophysical Journal*, in press, [arXiv:2103.11091], [Journal Article].
3. Riccardo Ciolfi, et al. include **Li, L.**, “Multi-Messenger Astrophysics with THESEUS in the 2030s”, 2021, [2021ExA...tmp..126C], *Experimental Astronomy*, [Journal Article].
4. R. Moradi, J. A. Rueda, R. Ruffini, **Liang Li**[Corresponding Author], C. L. Bianco, S. Campion, C. Cherubini, S. Filippi, Y. Wang, and S. S. Xue, “Nature of the ultrarelativistic prompt emission phase of GRB 190114C”, *Physical Review D*, 104, 063043 (2021), [2021PhRvD.104f3043M], [Journal Article].
5. Qing-Wen Tang, Kai Wang, **Liang Li**, and Ruo-Yu Liu, “Prevalence of Extra Power-Law Spectral Components in Short Gamma-Ray Bursts”, 2021, [arXiv:2103.15355], *The Astrophysical Journal*, in press, [Journal Article].
6. R. Ruffini, R. Moradi, J. A. Rueda, **L. Li**, N. Sahakyan, Y.-C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B. Pisani, D. Primorac, S. S. Xue, “The conical morphology, jetted GeV emission, and X-ray afterglows of long GRBs”, *Monthly Notices of Royal Astronomical Society*, [2021MNRAS.504.5301R], [Journal Article].
7. **Liang Li**, Felix Ryde, Asaf Pe’er, Hoi-Fung Yu, and Zeynep Acuner “Bayesian Time-Resolved Spectroscopy of Multi-Pulsed GRBs: Variations of Emission Properties amongst Pulses”, 2021, *The Astrophysical Journal Supplement Series*, [2021ApJS..254...35L], [Journal Article].
8. Bing Zhang, Yu Wang, **Liang Li**, “Dissecting Energy Budget of a Gamma-Ray Burst Fireball”, *The Astrophysical Journal Letters*, [2021ApJ...909L...3Z], [Journal Article].
9. **Liang Li**, and Bing Zhang, “Testing High-latitude Curvature Effect of Gamma-Ray Bursts with *Fermi* Data: Evidence of Bulk Acceleration in Prompt Emission”, 2021, *The Astrophysical*

Journal Supplement Series, 253, 43, [2021ApJS..253...43L], [Journal Article].

10. M.G. Dainotti, S. Livermore, D. A. Kann, **L. Li**[Corresponding Author], S. Oates, S. Yi, B. Zhang, B. Gendre, B. Cenko, and N. Fraija, “The Optical Luminosity-Time Correlation for More Than 100 Gamma-Ray Burst Afterglows”, 2020, *The Astrophysical Journal Letters*, 905, 26, [2020ApJ...905L..26D], [Journal Article].

11. **Liang Li**, “Thermal Components in Gamma-ray Bursts. II. Constraining the Hybrid Jet Model”, 2020, *The Astrophysical Journal*, 894, 100L, [2020ApJ...894..100L], [Journal Article].

12. **Liang Li**, “Thermal Components in Gamma-ray Bursts. I. How Do They Affect Non-Thermal Spectral Parameters?”, 2019, *The Astrophysical Journal Supplement Series*, 245, 7L, [2019ApJS..245....7L], [Journal Article].

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13. **Liang Li**, Jin-Jun Geng, Yan-Zhi Meng, Xue-Feng Wu, Yong-Feng Huang, Yu Wang, Rahim Moradi, Z.Lucas Uhm, and Bing Zhang, “Double-tracking Characteristic of the Spectral Evolution of GRB 131231A: Synchrotron Origin?”, *The Astrophysical Journal*, 884, 109L, [2019ApJ...884..109L], [Journal Article].

14. Y. Wang, J. A. Rueda, R. Ruffini, L. Becerra, C. Bianco, L. Becerra, **L. Li**, and M. Karlica, “Two Predictions of Supernova: GRB 130427A/SN 2013cq and GRB 180728A/SN 2018fip”, 2019, *The Astrophysical Journal*, 874, 39W, [2019ApJ...874...39W], [Journal Article].

15. **Liang Li**, “Multi-Pulse *Fermi* Gamma-Ray Bursts I: Evidence of the Transition from Fireball to Poynting-flux-dominated Outflow”, 2019, *The Astrophysical Journal Supplement Series*, 242, 16L, [2019ApJS..242...16L], [Journal Article].

16. Felix Ryde, Hoi-Fung Yu, Husne Dereli, Christoffer Lundman, Asaf Pe'er, and **Liang Li**, “On the α -Intensity Correlation in Gamma-ray Bursts: Subphotospheric Heating with Varying Entropy”, 2019, *Monthly Notices of the Royal Astronomical Society*, 484, 1912, [2019MNRAS.484.1912R], [Journal Article].

17. Ruffini, R.; Wang, Y.; Aimuratov, Y.; Becerra, L.; Bianco, C. L.; Karlica, M.; Kovacevic, M.;

- Li, L.**; Melon Fuksman, J. D.; Moradi, R.; and 8 coauthors, “Early X-Ray Flares in GRBs”, 2018, *The Astrophysical Journal*, 852, 53R, [2018ApJ...852...53R], [Journal Article].
18. **Liang Li**, Xue-Feng Wu, Wei-Hua Lei, Zi-Gao Dai, En-Wei Liang, and Felix Ryde, 2018, “Constraining the Type of Central Engine of GRBs with *Swift* Data”, *The Astrophysical Journal Supplement Series*, 236, 26L, [2018ApJS..236...26L], [Journal Article].
19. **Liang Li**, Yu Wang, Lang Shao, Xue-Feng Wu, Yong-Feng Huang, Bing Zhang, Felix Ryde, and Hoi-Fung Yu, “A Large Catalogue of Multi-wavelength GRB Afterglows I: Colors Evolution And Its Physical Implication”, 2018, *The Astrophysical Journal Supplement Series*, 234, 26L, [2018ApJS..234...26L], [Journal Article].
20. Ackermann, M. et al. include **Li, L.**; “*Fermi* Large Area Telescope Detection of Extended Gamma-Ray Emission from the Radio Galaxy Fornax A”, 2016, *The Astrophysical Journal*, 826, 1A, [2016ApJ...826....1A], [Journal Article].
21. Geng, J. J.; Wu, X. F.; Huang, Y. F.; **Li, L.**; Dai, Z. G., “Imprints of Electron-Positron Winds on the Multiwavelength Afterglows of Gamma-ray Bursts”, 2016, *The Astrophysical Journal*, 825, 107G, [2016ApJ...825..107G], [Journal Article].
22. Ackermann, M. et al. include **Li, L.**; “*Fermi*-LAT Observations of the LIGO Event GW150914”, 2016, *The Astrophysical Journal Letters*, 823L, 2A, [2016ApJ...823L...2A], [Journal Article].
23. Ackermann, M. et al. include **Li, L.**; “*Fermi* LAT Stacking Analysis of Swift Localized GRBs”, 2016, *The Astrophysical Journal*, 822, 68A, [2016ApJ...822...68A], [Journal Article].
24. Fabio Acero et al. include **Li, L.**; “The 1st *Fermi* Lat Supernova Remnant Catalog”, 2016, *The Astrophysical Journal Supplement Series*, 224, 8A [2016ApJS..224....8A], [Citations (130)], [Journal Article].
- 4
25. Ajello, M. et al. include **Li, L.**; “Search for Spectral Irregularities due to Photon-Axionlike-Particle Oscillations with the *Fermi* Large Area Telescope”, 2016, *Physical Review Letters*, 116p, 1101A, [2016PhRvL.116p1101A], [Journal Article].

26. Ackermann, M. et al. include **Li, L.**; “Resolving the Extragalactic -Ray Background above 50 GeV with the *Fermi* Large Area Telescope”, 2016, *Physical Review Letters*, 116o, 1105A, [2016PhRvL.116o1105A], [Citations (115)], [Journal Article].
27. Ackermann, M. et al. include **Li, L.**; “Measurement of the high-energy gamma-ray emission from the Moon with the *Fermi* Large Area Telescope”, 2016, *Physical Review D*, 93h2001A, [2016PhRvD..93h2001A], [Journal Article].
28. Acero, F. et al. include **Li, L.**; “Development of the Model of Galactic Interstellar Emission for Standard Point-source Analysis of *Fermi* Large Area Telescope Data”, 2016, *The Astrophysical Journal Supplement Series*, 223, 26A, [2016ApJS..223...26A], [Citations (242)], [Journal Article].
29. Ajello, M. et al. include **Li, L.**; “Deep Morphological and Spectral Study of the SNR RCW 86 with *Fermi*-LAT”, 2016, *The Astrophysical Journal*, 819, 98A, [2016ApJ...819...98A], [Journal Article].
30. Ackermann, M. et al. include **Li, L.**; “Search for Gamma-Ray Emission from the Coma Cluster with Six Years of *Fermi*-LAT Data”, 2016, *The Astrophysical Journal*, 819, 149A, [2016ApJ...819..149A], [Journal Article].
31. Ajello, M. et al. include **Li, L.**; “*Fermi*-LAT Observations of High-Energy Gamma-Ray Emission toward the Galactic Center”, 2016, *The Astrophysical Journal*, 819, 44A, [2016ApJ...819...44A], [Citations (278)], [Journal Article].
32. Ackermann, M. et al. include **Li, L.**; “Deep view of the Large Magellanic Cloud with six years of *Fermi*-LAT observations”, 2016, *Astronomy and Astrophysics*, 586A, 71A, [2016A&A...586A..71A], [Journal Article].
33. Ackermann, M. et al. include **Li, L.**; “2FHL: The Second Catalog of Hard *Fermi*-LAT Sources”, 2016, *The Astrophysical Journal Supplement Series*, 222, 5A, [2016ApJS..222....5A], [Citations (199)], [Journal Article].
34. Ackermann, M. et al. include **Li, L.**; “An extremely bright gamma-ray pulsar in the Large

Magellanic Cloud”, 2015, *Science*, 350, 801F, [2015Sci...350..801F], [Journal Article].

35. Ackermann, M. et al. include **Li, L.**; “Searching for Dark Matter Annihilation from Milky Way Dwarf Spheroidal Galaxies with Six Years of *Fermi* Large Area Telescope Data”, 2015, *Physical Review Letters*, 115w, 1301A, [2015PhRvL.115w1301A], [Citations (821)], [Journal Article].

36. Ackermann, M. et al. include **Li, L.**; “Multiwavelength Evidence for Quasi-periodic Modulation in the Gamma-ray Blazar PG 1553+113”, 2015, *The Astrophysical Journal Letters*, 813L, 41A, [2015ApJ...813L..41A], [Journal Article].

5

37. Ackermann, M. et al. include **Li, L.**; “Search for extended gamma-ray emission from the Virgo galaxy cluster with *Fermi*-LAT”, 2015, *The Astrophysical Journal*, 812, 159A, [2015ApJ...812..159A], [Journal Article].

38. Ackermann, M. et al. include **Li, L.**; “The Third Catalog of Active Galactic Nuclei Detected by the *Fermi* Large Area Telescope”, 2015, *The Astrophysical Journal*, 810, 14A, [2015ApJ...810...14A], [Citations (421)], [Journal Article].

39. C. J. Clark et al. include **Li, L.**; “PSR J1906+0722: An Elusive Gamma-ray Pulsar”, 2015, *The Astrophysical Journal Letters*, 809L, 2C, [2015ApJ...809L...2C], [Journal Article].

40. Ackermann, M. et al. include **Li, L.**; “Search for Early Gamma-ray Production in Supernovae Located in a Dense Circumstellar Medium with the *Fermi* LAT”, 2015, *The Astrophysical Journal*, 807, 169A, [2015ApJ...807..169A], [Journal Article].

41. Wang, Xiang-Gao; Zhang, Bing; Liang, En-Wei; Gao, He; **Li, Liang**; Deng, Can-Min; Qin, Song-Mei; Tang, Qing-Wen; Kann, D. Alexander; Ryde, Felix; Kumar, Pawan, “How Bad or Good Are the External Forward Shock Afterglow Models of Gamma-Ray Bursts?”, 2015, *The Astrophysical Journal Supplement Series*, 219, 9W, [2015ApJS..219....9W], [Journal Article].

42. Ackermann, M. et al. include **Li, L.**; “Updated search for spectral lines from Galactic dark matter interactions with pass 8 data from the *Fermi* Large Area Telescope”, 2015, *Physical Review D*, 9112002A, [2015PhRvD..9112002A], [Citations (232)], [Journal Article].

43. Acero, F. et al. include **Li, L.**; “*Fermi* Large Area Telescope Third Source Catalog”, 2015, *The Astrophysical Journal Supplement Series*, 218, 23A, [2015ApJS..218...23A], [Citations (1264)], [Journal Article].
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48. En-Wei Liang, **Liang Li**, He Gao, Bing Zhang, Qing-Wen Tang, Jie-Min Chen, Hou-Jun Lu, Jin Zhang, Shuang-Xi Yi, Zi-Gao Dai, Rui-Jing Lu, Lian-Zhong Lu, and Jian-Yan Wei, “A
6
Comprehensive Study of Gamma-Ray Burst Optical Emission: II. Afterglow Onset and Late Re-Brightening Components”, 2013, *The Astrophysical Journal*, 774, 13, [2013ApJ...774...13L], [Journal Article].
49. **Liang Li**, En-Wei Liang, Qing-Wen Tang, Jie-Min Chen, Shao-Qiang Xi, Hou-Jun Lu, Bing Zhang, Jin Zhang, Shuang-Xi Yi, Rui-Jing Lu, Lian-Zhong Lu, and Jian-Yan Wei, “A Comprehensive

Study of Gamma-Ray Burst Optical Emission. I. Flares and Early Shallow-decay

Component”, 2012, *The Astrophysical Journal*, 758, 27, [2012ApJ...758...27L], [Journal Article].

Moradi Rahim

Position: **Faculty member of ICRANet**

Period covered: **2019-**

I Scientific Work

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- **Chair of parallel session; Sixteenth Marcel Grossmann Meeting 5-10 July 2021**
- **Program Committee; The 17th Italian-Korean Symposium for Relativistic Astrophysics August 02, 2021 – August 06, 2021**
- **Invited plenary talk; Sixteenth Marcel Grossmann Meeting 5-10 July 2021 Talk title: GRB-SN association**
- **Member of Organizing Committee; ICRANet-ISFAHAN Astronomy Meeting 3-5 Nov 2021**
- **Workshop on Deep learning in Astronomy:ICRANet-ISFAHAN Astronomy Meeting 4 Nov 2021**

II b Work With Students

1. **Deep Learning in Searching the Spectroscopic Redshift of Quasars. F. RastegarNia, M. T. Mirtorabi, R. Moradi, A. Vafaei. Sadr, Y. Wang, MNRAS DOI: 10.1093/mnras/stac076**
 2. **The mass and spin of black hole and emission of the “blackholic quanta” in GRB 180720B obtained from the ultrarelativistic prompt emission (UPE) phase**
- F. RastegarNia, R. Moradi, J. A. Rueda, R. Ruffini, Liang. Li, S. E. Askestani, Y. Wang, S. S. Xue, Submitted to PRD**

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2021 List of Publication

1. Nature of the ultrarelativistic prompt emission phase of GRB 190114C; R. Moradi, J. A. Rueda, R. Ruffini, Liang Li, C. L. Bianco, S. Campion, C. Cherubini, S. Filippi, Y. Wang, S. S. Xue, PRD 104, 063043 - Published 29 September 2021

2. brief review of binary-driven hypernova, J. A. Rueda, R Ruffini, R. Moradi, Y Wang;

International Journal of Modern Physics D, 2130007 2021

3. The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs; R. Ruffini, R. Moradi , J.A. Rueda, et al; MNRAS, Volume 504, Issue 4, July 2021, Pages 5301–5326, <https://doi.org/10.1093/mnras/stab724>

4. he newborn black hole in GRB 191014C manifests that is alive; R. Moradi, J.A. Rueda, R. Ruffini, Y. Wang. A&A 649, A75 (2021). <https://doi.org/10.1051/0004-6361/201937135>.

5. Deep Learning in Searching the Spectroscopic Redshift of Quasars. F. RastegarNia, M. T. Mirtorabi, R. Moradi, A. Vafaei. Sadr, Y. Wang, MNRAS 2022 DOI: 10.1093/mnras/stac076

Brian Punsly

Position: Research Scientist

Period covered: 10/2020 – 10/2021



I Scientific Work

Black Holes and Quasars

1. Introduction

This report describes the research performed by Brian Punsly and collaborators in cooperation with ICRANet in 2021. The research was directed at finding environmental factors that are related to the switch-on of the general relativistic engine responsible for the few percent of accreting black holes that drive powerful relativistic jets.

2. Observing the Time Evolution of the Multicomponent Nucleus of 3C 84

Abstract:

The advent of global millimeter-band very long baseline interferometry (VLBI) in recent years has finally revealed the morphology of the base of the two most prominent nearby, bright, extragalactic radio jets in M87 and 3C 84. The images are quite surprising considering the predictions of jet theory and current numerical modeling. The jet bases are extremely wide compared to expectations, and the nucleus of 3C 84 is very complicated. It appears as a double nucleus in 86 GHz observations with 50 μas resolution and a triple nucleus with 30 μas resolution with space-based VLBI by RadioAstron at 22 GHz. What is even odder is that the double and triple nuclei are arranged along an east–west line that is approximately orthogonal to the north–south large-scale jet on 150 μas –4 mas scales. We explore the emergence of an (east–west) double nucleus in the lower-resolution 43 GHz Very Long Baseline Array (VLBA) imaging from 2018 August to 2020 April. The double nucleus is marginally resolved. We exploit the east–west resolution associated with the longest baselines, ~ 0.08 mas, to track a predominantly east–west separation speed of $\approx 0.086 \pm 0.008c$. We estimate that the observed mildly relativistic speed persists over a de-projected distance of ~ 1900 – 9800 times the central, supermassive black hole gravitational radius (~ 0.3 – 1.5 ltyr) from the point of origin.

3. The Bulk Flow Velocity and Acceleration of the Inner Jet in M87

ABSTRACT:

A high sensitivity, 7 mm Very Long Baseline Array image of M87 is analyzed in order to estimate the jet velocity within 0.65 mas of the point of origin. The image captured a high signal-to-noise, double-ridged, counter-jet extending ~ 1 mas from the nucleus. After defining conditions and requirements that justify approximate time averaged bilateral symmetry, a continuous set of Lorentz transformations are found that map the double-ridged counter-jet intensity profile into the double-ridged jet intensity profile. The mapping is realized by a uniformly accelerating flow with intrinsic velocity of $\sim 0.27c$ at 0.4 mas (a de-projected distance of

0.38 lt-yr) to 0.38c at 0.65 mas (a de-projected distance of 0.61 lt-yr) from the nucleus. Since the velocity field is derived from the global surface brightness profile and does not depend on the motion of enhanced features, it is most likely a bulk flow velocity as opposed to a pattern velocity. This interpretation is corroborated by the fact that the distribution of the apparent velocities of previously identified individual features (from the literature) within 0.65 mas of the nucleus are consistent with local hydrodynamic shocks being advected with the local bulk flow velocity. The bulk flow velocity of the visible inner jet is a constraint that can potentially break degeneracies between numerical simulations that are designed to replicate both the annulus that was imaged by the Event Horizon Telescope as well as the base of the inner jet.

4. Did the Event Horizon Telescope Detect the Base of the Sub-milliarcsecond Tubular Jet in M87?

ABSTRACT:

A high-sensitivity, 7 mm Very Long Baseline Array image of M87 was previously analyzed in order to estimate the bulk flow jet velocity between 0.4 and 0.65 mas from the point of origin using the asymmetry between the well characterized double-ridged counter-jet (unique to this image) and the double-ridged jet. We use this same image to estimate the cross-sectional area of this tubular stream. The velocity, acceleration, cross-sectional area, and flux density along this stream determine a unique, perfect magnetohydrodynamic jet solution that satisfies conservation of energy, angular momentum, and mass (a monotonic conversion of Poynting flux to kinetic energy flux along the jet). The solution is protonic and magnetically dominated. The bilateral jet transports $\approx 1.2 \times 10^{-4}$ solar masses per year and $\approx 1.1 \times 10^{42}$ erg/sec, placing strong constraints on the central engine. A Keplerian disk source that also produces the Event Horizon Telescope (EHT) annulus of emission can supply the energy and mass if the vertical magnetic field at the equator is $\sim 1\text{--}3.5$ G (depending on location). A Parker spiral magnetic field, characteristic of a wind or jet, is consistent with the observed EHT polarization pattern. Even though there is no image of the jet connecting with the annulus, it is argued that these circumstances are not coincidental and the polarized portion of the EHT emission is mainly jet emission in the top layers of the disk that is diluted by emission from an underlying turbulent disk. This is a contributing factor to the relatively low polarization levels that were detected.

II Conferences and educational activities

N/A

III. Service activities *N/A*

IV. Other

2021 List of Publication

Punsly, Brian; Nagai, Hiroshi; Savolainen, Tuomas; Orienti, Monica, “Observing the Time Evolution of the Multicomponent Nucleus of 3C 84”, 2021 ApJ 911 19

Punsly, Brian “The Bulk Flow Velocity and Acceleration of the Inner Jet in M87”, 2021 ApJ 918 4

Punsly, Brian and Sina Chen “Did the Event Horizon Telescope Detect the Base of the Sub-milliarcsecond Tubular Jet in M87?”, 2021 ApJ 921L 38

Jorge A. Rueda H.

Personal Information

Date of Birth October 24, 1982

Place of Birth Barrancabermeja, Colombia

Birth

Citizenship Colombian

Education

2009–2010 *Postdoctoral fellow*, Sapienza University of Rome, Rome, Italy

Conducted research: *Unified treatment for the description of nuclei and neutron stars based on the Thomas-Fermi model*

2006–2009 *Ph.D in Relativistic Astrophysics*, Sapienza University of Rome, Italy
Thesis title: *Electrodynamics: from nuclei to neutron stars*

Thesis Advisor: Prof. Remo Ruffini

2005–2006 *Master in Physics*, Universidad de Los Andes, Mérida, Venezuela – Universidad Industrial de Santander, Bucaramanga, Colombia

Thesis title: *Radiant shock waves in the post-quasistatic approximation*

Thesis Advisor: Prof. Luis Nuñez

2000–2005 *Physicist*, Universidad Industrial de Santander, Bucaramanga, Colombia

Thesis title: *Equilibrium of binary systems involving one extreme object in the stationary vacuum case*

Thesis Advisor: Prof. Jose David Sanabria Gómez

Additional Qualifications

Computer Skills

Operative
Systems Linux, Windows

Programming
Languages Fortran 77, Fortran 90, C, C++, Python Wolfram

Scientific
Software Mathematica, Maple, Gnuplot, LaTeX

Languages

Spanish Native

Italian Spoken (excellent), listen comprehension (excellent), written (excellent) English
Spoken (very good), listen comprehension (very good), written (excellent)

Portuguese Spoken (very good), listen comprehension (excellent), written (very good)

Employment History

Administrative

2013–2017 Coordinator CAPES-ICRANet Program, International Center for Relativistic
Astrophysics Network (ICRANet), Pescara, Italy

2011–current Coordinator of international, bilateral cooperation agreements at ICRANet,
Pescara, Italy

Scientific Research and Teaching

2012–current Faculty Professor, International Relativistic Astrophysics (IRAP) PhD
Program

2011–current Full Professor, ICRANet, Pescara, Italy

2019–current Professor, ICRANet-Unife joint appointment, Physics Department, University
of Ferrara, Italy

2011–current Associate Researcher, International Center for Relativistic Astrophysics
(ICRA), Rome, Italy

2012–2017 Professor, ICRANet-Sapienza joint appointment, Physics Department,
Sapienza University of Rome, Italy

2006–2011 Scientific Assistant of ICRANet, Pescara, Italy 2006–2011

Substitute Professor. Sapienza University of Rome, Italy

2006 Lecturer, Differential Calculus. Universidad de Los Andes, Mérida,
Venezuela

2005 Lecturer, Physics I. Universidad Industrial de Santander, Bucaramanga,
Colombia

2005 Lecturer, Waves and Oscillations. Universidad Industrial de Santander, Bucaramanga,
Colombia

2004 Assistant lecturer, Newtonian Mechanics. Universidad Industrial de San-
tander, Bucaramanga, Colombia Advisor of Undergraduate/Master Thesis

2019–current Student: Farhad Zekavat, University of Ferrara, Italy 2015–2016
 Student: Silvia Petroni, Sapienza University of Rome, Italy 2015–2016 Student:
 Davide Gizzi, Sapienza University of Rome, Italy

Advisor of Ph. D. Thesis

2018–2021 Student: Gulmira Nurbakyt, Al-Farabi Kazakh National University, Almaty,
 Kazakhstan

Thesis in progress: Gravitational field of compact objects in general theory of
 relativity

2018–2021 Student: Gulnur Zhumakhanova, Al-Farabi Kazakh National University,
 Almaty, Kazakhstan

Thesis in progress: Dark matter profiles in galactic bulges and halos 2017–

2020 Student: Eduar Becerra, Sapienza University of Rome, Italy

Universidad Industrial de Santander, Bucaramanga, Colombia

Thesis in progress: Neutrino-antineutrino annihilation and the genesis of the
 electron-positron pair plasma powering gamma-ray bursts

2016–2020 Student: Stefano Campion, Sapienza University of Rome, Italy

Thesis in progress: High-energy emission, proton-proton interactions, and
 magnetic pair production in the binary-driven hypernovae

2016–2020 Student: Massimo Carinci, Sapienza University of Rome, Italy Thesis in
 progress: Fermionic versus bosonic dark matter

2016–2019 Student: Geanderson Araujo Carvalho, Instituto Tecnológico de Aeroná-
 utica, Sao Jose dos Campos, Brazil

Thesis: White dwarfs in general relativity, modified theories of gravity and
 binary systems

2016–2019 Student: Ronaldo Vieira Lobato, Sapienza University of Rome, Italy Instituto
 Tecnológico de Aeronáutica, Sao Jose dos Campos, Brazil

Thesis: SGRs/AXPs and binary star mergers: electromagnetic and gravita-
 tional emission

2015–2018 Student: Juan David Uribe, Sapienza University of Rome, Italy

Thesis: Neutrino flavour oscillations in the process of hypercritical accretion: the
 case of binary-driven hypernovae

2015–2018 Student: José Rodriguez, Sapienza University of Rome, Italy

Thesis: Analytic approaches to the gravitational radiation from astrophysical sources

2013–2016 Student: Laura Becerra, Sapienza University of Rome, Italy

Thesis title: Accretion in compact stars: hypercritical accretion in the induced gravitational collapse and the post-merger evolution of white dwarf mergers

This PhD thesis was awarded with the International Astronomical Union (IAU) PhD Prize 2018, Division D, High Energy Phenomena and Fundamental Physics

- 2013–2016 Student: Gabriel Gómez, Sapienza University of Rome, Italy
University of Nice Sophia-Antipolis, Nice, France
- Thesis title: Astrophysical implications of the fermionic dark matter in galaxies
- 2012–2015 Student: Federico Cipolletta, Sapienza University of Rome, Italy
- Thesis title: Structure of rotating self-gravitating figures of equilibrium in Newtonian gravity and general relativity with an emphasis on neutron stars
- 2012–2015 Student: Fernanda Gomes Oliveira, Sapienza University of Rome, Italy
University of Nice Sophia-Antipolis, Nice, France
- Thesis title: X, gamma-ray and gravitational wave emission from short and long GRBs and their detection rates
- 2011–2015 Student: Diego Leonardo Cáceres Uribe, Sapienza University of Rome, Italy
- Thesis title: Massive fast rotating highly magnetized white dwarfs: theory and astrophysical applications
- 2011–2014 Student: Jonas Pedro Pereira, Sapienza University of Rome, Italy
University of Nice Sophia-Antipolis, Nice, France
- Thesis title: General relativistic electrodynamical processes in neutron stars and black holes
- 2011–2014 Student: Carlos Argüelles, Sapienza University of Rome, Italy
Thesis title: Fermionic dark matter on galaxy scales
- 2010–2013 Student: Sheyse Martins de Carvalho, Sapienza University of Rome, Italy
University of Nice Sophia-Antipolis, Nice, France
- Thesis title: Finite temperature effects in the white dwarf structure and neutron star cooling in general relativity
- 2008–2013 Student: Riccardo Belvedere, Sapienza University of Rome, Italy
- Thesis title: Static and rotating neutron stars in a general relativistic formulation of fundamental interactions and their astrophysical applications
- 2009–2012 Student: Kuantay Boshkayev, Sapienza University of Rome, Italy
- Thesis title: Rotating white dwarfs and neutron stars in general relativity

Supervisor of Post-doctoral Fellows

2013–2015 Riccardo Belvedere, CAPES-ICRANet Program Fellow at ICRANet - Riode Janeiro, Brazil

2013–2015 Rafael Camargo Rodrigues de Lima, CAPES-ICRANet Program Fellow at ICRANet - Pescara, Italy

2013–2015 Jaziel Goulart Coelho, CAPES-ICRANet Program Fellow at Sapienza University of Rome, Italy

Lecturer in Workshops and Ph. D. Schools (partial list)

2019 *RAGtime 21 workshop*, 16–20 September, Institute of Physics, Faculty of Philosophy and Science of the Silesian University in Opava, Czech Republic

- 2019 *The Open Universe International Doctoral School: "The discovery of BlackHoles"*, 10–14 June, Nice, France
- 2018 *41th International School for Young Astronomers (ISYA)*, 23–27 July, ElSocorro, Colombia
- 2017 *Fifth Bego Rencontres - IRAP Ph.D. Erasmus Mundus School*, 15–19 May, Nice, France
- 2016 *Fourth Bego Rencontres - IRAP Ph.D. Erasmus Mundus School*, 30 May–3 June, Nice, France
- 2014 *Third Bego Rencontres - IRAP Ph.D. Erasmus Mundus School*, 9–19 September, Nice, France
- 2014 *IRAP Ph.D. Erasmus Mundus School*, 11–16 May, Les Houches, France
- 2013 *Second Bego Rencontres - IRAP Ph.D. Erasmus Mundus School*, 16–31 May, Nice, France
- 2012 *IRAP Ph.D. Erasmus Mundus School*, 3–21 September, Nice, France
- 2011 *IRAP Ph.D. Erasmus Mundus School*, 5–16 September, Nice, France
- 2011 *IRAP Ph.D. Erasmus Mundus School*, May 25–June 10, Nice, France
- 2011 *IRAP Ph.D. Erasmus Mundus Workshop: From Nuclei to White Dwarfs and Neutron Stars*, 3–8 April, Les Houches, France
- 2010 *IRAP Ph.D. Erasmus Mundus School*, 1–30 September, Nice, France

Organization of Conferences

- 2018 *15th Marcel Grossmann Meeting on Relativistic Astrophysics*, 1–7 July, Rome, Italy
- 2018 *2nd Julio Garavito Armero Meeting on Relativistic Astrophysics*, 1–2 August, Bucaramanga, Colombia
- 2018 *The Third Zeldovich meeting*, 23–27 April, Minsk, Belarus
- 2017 *15th Italian-Korean Symposium on Relativistic Astrophysics*, 3–7 July, Seoul, South Korea
- 2017 *The Fifth Galileo-Xu Guangqi Meeting*, 25–30 June, Chengdu, China
- 2016 *Supernovae, Hypernovae and Binary Driven Hypernovae - An Adriatic Workshop*, 20–30 June, Pescara, Italy
- 2015 *14th Italian-Korean Symposium on Relativistic Astrophysics*, 20–24 July, Pescara, Italy
- 2015 *First Sandoval Vallarta Caribbean Meeting*, 30 November–3 December, Mexico City, Mexico
- 2015 *First Julio Garavito Armero Meeting on Relativistic Astrophysics*, 23–27 November, Bucaramanga, Colombia

Speaker in Plenary Session

- 2019 *RAGtime 21 workshop*, 16–20 September, Institute of Physics, Faculty of Philosophy and Science of the Silesian University in Opava, Czech Republic

- 2018 *Nuevos límites a la naturaleza de la materia oscura a partir de observables de la Vía Láctea*, 2nd Julio Garavito Armero Meeting on Relativistic Astrophysics, Bucaramanga, Colombia
- 2018 *Binary-driven hypernovae and the understanding of gamma-ray bursts*, 15th Marcel Grossmann Meeting, Rome, Italy
- 2018 *Latest news on the induced gravitational collapse scenario of long gamma-ray bursts*, The Third Zeldovich meeting, Minsk, Belarus
- 2018 *Simulating the induced gravitational collapse scenario of gamma-ray bursts*, Conference on Particles and Cosmology, 5–9 March, Singapore
- 2017 *¿Hacia dónde van la astronomía y la astrofísica en Colombia?*, 20 October, Universidad Industrial de Santander, Bucaramanga, Colombia
- 2017 *Binary-driven hypernovae as multimessenger astrophysical systems*, THE- SEUS Workshop, 5–6 October, Naples, Italy
- 2017 *News on neutrino astrophysics from gamma-ray bursts*, 9th European Summer School on Experimental Nuclear Astrophysics, 17–24 September, Santa Tecla, Italy
- 2017 *On the detection rate of the gravitational-wave emission of short and long gamma-ray bursts*, The Fifth Galileo-Xu Guangqi Meeting, 25–30 June, Chengdu, China
- 2017 *On the rate and gravitational wave emission of short and long GRBs*, 15th Italian-Korean Symposium on Relativistic Astrophysics, 3–7 July, Seoul, South Korea
- 2015 *On the binary systems associated with short and long GRBs and their detectability*, 14th Marcel Grossmann Meeting, Rome, Italy
- 2012 *Extreme systems in relativistic astrophysics*, 3rd Colombian Meeting on Astronomy and Astrophysics, Bucaramanga, Colombia
- 2012 *Strong, weak, electromagnetic, and gravitational interactions in neutron stars*, 13th Marcel Grossmann Meeting, Stockholm, Sweden
- 2011 *On the Einstein-Maxwell-Thomas-Fermi equations for white dwarfs and neutron stars*, 3rd Galileo-Xu Guangqi Meeting, Beijing, China
- 2009 *A the self-consistent treatments of neutron star configurations*, 11th Italian-Korean Symposium on Relativistic Astrophysics, Seoul, Korea
- 2009 *The role of compressed electrons: from nuclei to neutron stars*, 1st Galileo-Xu Guangqi Meeting, Shanghai, China

Speaker in Ordinary Sessions (partial list)

- 2018 *15th Marcel Grossmann Meeting on Relativistic Astrophysics*, 1-7 July, Rome, Italy
- 2018 *2nd Julio Garavito Armero Meeting on Relativistic Astrophysics*, 1–2 August, Bucaramanga, Colombia

2018 *The Third Zeldovich meeting*, 23–27 April, Minsk, Belarus

2017 *15th Italian-Korean Symposium on Relativistic Astrophysics*, 3–7 July, Seoul, South Korea

2017 *The Fifth Galileo-Xu Guangqi Meeting*, 25–30 June, Chengdu, China

- 2016 *Supernovae, Hypernovae and Binary Driven Hypernovae - An Adriatic Workshop*, Pescara, Italy
- 2015 *14th Italian-Korean Symposium on Relativistic Astrophysics*, Pescara, Italy
- 2013 *13th Italian-Korean Symposium on Relativistic Astrophysics*, Seoul, South Korea
- 2012 *26th Texas Symposium on Relativistic Astrophysics*, Sao Paulo, Brazil
- 2012 *III National Meeting on GRBs "Lampi su Napoli"*, Naples, Italy
- 2012 *39th COSPAR Assembly*, Mysore, India
- 2012 *13th Marcel Grossmann Meeting*, Stockholm, Sweden
- 2011 *12th Italian-Korean Symposium on Relativistic Astrophysics*, Pescara, Italy
- 2011 *Recent News from the MeV, GeV and TeV Gamma-Ray Domains*, Pescara, Italy
- 2010 *2nd Galileo-Xu Guangqi Meeting*, Ventimiglia, Italy
- 2009 *6th Italian-Sino Workshop on Relativistic Astrophysics*, Pescara, Italy
- 2009 *1st Sobral Meeting*, Fortaleza, Brazil
- 2008 *3rd Stueckelberg Workshop on Relativistic Field Theories*, Pescara, Italy
- 2009 *12th Marcel Grossmann Meeting On General Relativity*, Paris, France
- 2008 *APS April Meeting*, St. Louis, USA
- 2007 *4th Italian-Sino Workshop on Relativistic Astrophysics*, Pescara, Italy
- 2006 *Centro de Física Fundamental-Universidad de Los Andes*, Merida, Venezuela
- 2005 *Laboratorio de Astronomía y Física Teórica-Universidad del Zulia*, Mara-caibo, Venezuela
- 2005 *Laboratorio de Astronomía y Física Teórica-Universidad del Zulia*, Mara-caibo, Venezuela
- 2005 *Primera Reunión Colombo-Venezolana de Relatividad y Gravitación*, Cartagena, Colombia
- 2005 *Segundo Taller de Gravitación, Cosmología y Objetos Compactos*, Universidad de Los Andes, Merida, Venezuela
- Outreach Activities*
- 2018 *Three-dimensional view of hypernovae and gamma-ray bursts*. Delivered at the inauguration of the exhibition "Einstein Fermi e Heisenberg e la nascita della Astrofisica Relativistica" e "ICRANet e Cina", 12 December 2017 - 12 January 2018, Fondazione Marco Besso, Roma, Italy
- 2017 *"Vida" después de la "muerte": estrellas de neutrones y las explosiones más potentes del Universo*. Delivered in the "Café Científico" at Casa del Libro Total, Bucaramanga, Colombia
- 2017 *"Vida" después de la "muerte": estrellas de neutrones y las explosiones más potentes del Universo*. Delivered at Instituto Antonio Nariño, Barran- cabermeja, Colombia
- 2017 *Simulando le onde gravitazionali*. Delivered at "La Notte dei Ricercatori", Pescara, Italy

2016 *Dai nuclei atomici alle stelle di neutroni ai lampi di raggi gamma.* Delivered at “La Notte dei Ricercatori”, Pescara, Italy

2016 *Dai nuclei atomici alle stelle di neutroni ai lampi di raggi gamma*. Delivered at “La Notte dei Ricercatori”, Pescara, Italy

2015 *Stelle di neutroni nelle esplosioni più potenti dell'universo: supernove e lampi di raggi gamma*. Delivered at “La Notte dei Ricercatori”, Pescara, Italy

2014 *Dai nuclei alle pulsar ai gamma-ray bursts*. Delivered at the ICRANet for high-school students, Pescara, Italy

Reviewer and/or Referee

Scientific Journal Referee *The Astrophysical Journal, The Physical Review (C,D), Monthly Notices of the Astronomical Royal Society, Astronomy and Astrophysics, Physics Letters B, Nuclear Physics A, European Journal of Physics, Astrophysics and Space Science, Researches in Astronomy and Astrophysics, Canadian Journal of Physics, Advances and Space Research, Universe, Symmetry, Mathematical Reviews of the American Mathematical Society*

Projects Referee Estonian Research Council (ETAg), Estonia

Projects Referee Science of Frontier 2019, National Council of Science and Technology, CONACYT-Gobierno de México, Mexico

Scientific Advisor National Center of Science and Technology Evaluation, Ministry of Education and Science, Kazakhstan

Projects Referee Agencia Nacional de Promoción Científica y Tecnológica and Fondo para la Investigación Científica y Tecnológica del Ministerio de Ciencia, Tecnología e Innovación Productiva, Argentina

Memberships

INAF, Istituto di Astrofisica e Planetologia Spaziali Member of the Italian Physical Society

Member of the American Physical Society

Member of the International Astronomical Union – Division D “High Energy Phenomena and Fundamental Physics”

Member of the Brazilian Physical Society

Member of the Colombian Academy of Physical and Natural Sciences – Node AstroCO-IAU

Awards

Award 2019 Third Award in the Gravity Research Foundation essay competition, Gravity Research Foundation, USA

Award 2016 Distinguished Graduate Award, Universidad Industrial de Santander, Bucaramanga, Colombia

Fellowship Senior Visiting Professor Fellowship, CAPES-ICRANet Program, Brazil
2013-2016

Fellowship Postdoctoral Fellowship, Sapienza University of Rome, Rome, Italy
2010

- Fellowship 2006-2009 Ph.D. Fellowship, International Relativistic Astrophysics Ph. D. Program, Sapienza University of Rome, Italy
- Award 2005 *National Prize Otto de Greiff to the best undergraduate thesis*, August 2006. Best undergraduate thesis of Natural Sciences in Colombia 2005: *Equilibrium of binary systems involving one extreme object in the stationary vacuum case*, Bucaramanga, Colombia
- Award 2005 Awarded undergraduate thesis: *Equilibrium of binary systems involving one extreme object in the stationary vacuum case*, May 2005. Physics Department, Universidad Industrial de Santander, Bucaramanga, Colombia
- Fellowship 2002 Distinguished student, Physics Department, Universidad Industrial de Santander, Bucaramanga, Colombia
- Award High-School Award for the results in the National Test of Knowledge (371/400) in 1999. Instituto Antonio Nariño, Barrancabermeja, Colombia
- Award 1999 First place in the XV Natural Sciences Olympiads, 1999. Award: fellowship to pursue any university career at Universidad Autónoma de Bucaramanga (UNAB)-Instituto Caldas, Bucaramanga, Colombia

Ruffini Remo

Short CV of Professor Remo Ruffini

Director of ICRANet, coauthor of more than 800 scientific publications and 13 books, Remo Ruffini received his doctorate at Sapienza in Rome in 1967. He taught in Hamburg, at Princeton University and the Institute for Advanced Study, in Japan, Australia and CBPF (Brazil). Some of his major results: boson stars, “Introducing the Black Hole” with J.A. Wheeler, and the limiting critical mass of neutron stars. He identified the first black hole in our Galaxy using UHURU satellite data with Giacconi (Nobel recipient 2002), and received the Cressy Morrison Award (1973). Returning to Sapienza (1978), he promoted a Rome-Stanford collaboration on gravitational wave detectors. With European, US and Chinese institutions he established the International Center for Relativistic Astrophysics (ICRA) and later ICRANet in Italy, Armenia, France and Brazil (2005). He developed an understanding of gamma ray bursts, confirmed by the largest telescopes on Earth and from space: from their discovery in 1973, to their cosmological origin in 1997, to determining seven different GRBs families and their conceptual understanding, in 2018. This has enabled GRBs, the largest explosions in the Universe, to be used to enlighten our comprehension of our Universe.



Prof. Remo Ruffini is coauthor, among others, of the following books (<http://www.icranet.org/RuffiniBooks>):

1. (with J. Bardeen, B. Carter, H. Gursky, S. Hawking, I. Novikov and K. Thorne) “Black holes”, Ed. B. and C. de Witt, Gordon and Breach, New York, 1973;
2. (with M. Rees and J.A. Wheeler) “Black Holes, Gravitational Waves and Cosmology”, Gordon and Breach N.Y. 1974, also translated in Russian as “Cernie Dirí Gratazionnie Volni I Kosmologia”, Mir, Moscow 1974;
3. (with H.Gursky) “Neutron Stars, Black Holes and Binaries Sources”, D. Reidel, Dordrecht, 1975;
4. (with R. Giacconi et al.) “Physics and Astrophysics of Neutron Stars Black Holes”, North Holland Pub. Co. Amsterdam 1978;
5. (with Humitaka Sato) “Black Holes”, in japanese, Chuo Koron-Sha, Tokyo 1976;

6. (with Fang Li Zhi) “Basic Concepts in Relativistic Astrophysics”, in chinese, Science Press, Beijing 1981, also translated into english,, World Scientific, Singapore 1983;
7. (with Francesco Melchiorri) “Gamow Cosmology”, North Holland Pub. Co., Amsterdam,1986;
8. (with H. Ohanian) “Gravitation and Spacetime” W.W. Norton and Co., New York 1976;
9. (with H. Ohanian) “Gravitazione e Spazio-Tempo” Zanichelli, Bologna 1997;
10. (with H. Ohanian) “Gravitation and Spacetime” W.W. Norton and Shin Won Agency Co., Seoul, 2001.

Scientific selected publications of Remo Ruffini, from SAO/NASA Astrophysics Data System (ADS)

More than 800 publications: <https://tinyurl.com/yczc7bov>

Awards received

- Cressy Morrison award of the New York Academy of Sciences , 1972.
- Fellow of the American Physical Society 1974-
- Fellow of Alfred P. Sloan Foundation, 1974-76.
- Space Scientist of the Year Award, 1992.
- Honorary Professor of University of Kirghizia, 1998-
- Commander of the Order of Merit of the Italian Republic, 2019 -
- Delfino d'Oro of Pescara Award, 2019.
- Rosone d'oro of Pianella Award, 2019.

Vereshchagin Gregory

Position: professor
Period covered: 2021



I Scientific Work

This year scientific work was focused on the following aspects:

- Reaction rates of three-particle interactions in relativistic plasma (with M.A. Prakapenia)

We perform calculations of nonequilibrium reaction rates for all triple interactions in relativistic plasma including: relativistic bremsstrahlung, double Compton scattering, radiative pair production, triple pair production/annihilation and their inverse processes. Reaction rates are computed out of first principles, numerically integrating exact QED matrix elements over the phase space of particles. Example is given for photon emission by hot thermal electron-positron pairs.

- Interaction rates in relativistic plasma with baryons (with M.A. Prakapenia)

In addition to interactions between electrons, positrons and photons we are considering electromagnetic interaction with baryons. The presence of baryons modifies kinetics in non-equilibrium relativistic plasma, with respect to the pure leptonic case. Instead of approximate expressions for reaction rates, used previously, we compute interaction rates out of first principles. We are also developing a new numerical code capable of solving relativistic kinetic equations for spherically symmetric case. This code will be used to study thermalization and transport in optically thick plasmas composed of electrons, positrons and photons.

- Correlations in relativistic plasma (with M.A. Prakapenia)

The relativistic Boltzmann equation is traditionally derived out of quantum field theory when particle correlations are neglected. We are reconsidering this derivation with the focus on conditions which can be used to derive kinetic equations for particle correlations. Such correlation analysis is important for establishment of validity conditions of relativistic Boltzmann equation, as well as to the study of non-equilibrium kinetics for strongly correlated relativistic plasmas.

- The motion and radiation of a test charged particle in the vicinity of a black hole (with S. O. Komarov and A. K. Gorbatsievich)

We are developing new methods for calculation of electromagnetic field from a test charge, moving in the vicinity of a black hole, taking into account both the curvature of the spacetime and the radiation reaction on the motion of the charge.

- Is magnetically dominated outflow required to explain GRBs? (with D. Begue and L. Li)

The composition of relativistic outflows producing gamma-ray bursts is a long standing open question. One of the main arguments in favor of magnetically dominated outflows is the absence of photospheric component in their broadband time resolved spectra, with such notable examples as GRB 080916C. Here we perform accurate analysis of time resolved spectra of this GRB and confirm the previous detection of additional spectral component in GRB 080916C. We show that this subdominant component is consistent with the photosphere of ultrarelativistic baryonic outflow, deep in the coasting regime. We argue that, contrary to previous statements, the magnetic dominance is not required for interpretation of observations of this GRB. Moreover, simultaneous detection of high energy emission in its prompt phase requires departure from a simple one-zone emission model.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Editing the proceedings of the 16th Marcel Grossman Meeting, with 390 papers, to be published by World Scientific in 2022.
- Editing the proceedings of the Fourth Zeldovich virtual meeting, with 37 papers published in the refereed journal *Astronomy Reports*, volume 65, issue 10, 2021, link: <https://link.springer.com/journal/11444/volumes-and-issues/65-10>;
- Organized a parallel session “GB3 - Photospheric Emission in GRBs” at MG16 co-chaired with D. Begue.
- talk “Diffusive photospheres in gamma-ray bursts”, 16th Marcel Grossman Meeting, July 5, 2021, online.
- talk “Kinetic effects in nonequilibrium electron-positron plasmas”, 107 SIF National Congress, 13-17 September 2021, online.

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

- consultations on the first lecture course on theoretical astrophysics for theoretical physics students at the Belarusian State University
- consultations on the lecture course on relativistic kinetic theory for theoretical physics students at the Belarusian State University

II e. Work With Postdocs

- Mikalai Prakapenia: Kinetics of nonuniform and (or) anisotropic relativistic plasma with correlations
- Stanislav Komarov: the motion and radiation of a test charged particle in the vicinity of a black hole

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

- member of the IRAP PhD Faculty
- coordination of cooperation with the Belarusian State University
- coordination of cooperation with the National Academy of Sciences of Belarus
- coordination of activities in ICRANet-Minsk center
- chair of the LOC of 16th Marcel Grossman meeting
- co-chair of the parallel session “GB3 - Photospheric Emission in GRBs” at MG16
- editor of the proceedings of MG16
- editor of the Fourth Zeldovich Meeting proceedings
- supervision of the ICRANet newsletter
- supervision of ICRANet press releases

III b. Outside ICRANet

- PI in the Joint BRFFR – ICRANet – 2021 program, project title: “Kinetics of nonuniform and (or) anisotropic relativistic plasma with correlations”
- PI in the Joint BRFFR – ICRANet – 2021 program, project title: “The motion and radiation of a test charged particle in the vicinity of a black hole”

IV. Other

2021 List of Publication

1. M. A. Prakapenia and G. V. Vereshchagin, “Numerical scheme for evaluating the collision integrals for triple interactions in relativistic plasma”, *Astronomy Reports*, volume 65 (2021), pp. 1011–1014.
2. D. Begue, L. Li and G. V. Vereshchagin, “Is magnetically dominated outflow required to explain GRBs?”, arXiv:2201.05062, submitted to MNRAS.

YU WANG

EMAIL: YU.WANG@ICRANET.ORG

INTRODUCTION

Yu Wang works on data of astrophysics, analyzing and interpreting the high-energy X-ray and gamma-ray data (e.g. Swift, NuSTAR and Fermi satellites), as well as collaborating on the optical data analysis. He also works on the theory of high-energy astrophysics, especially the neutron star, black hole and gamma-ray burst. Based on the experience of data analysis, theoretical modelling and computer programming, Yu Wang currently focuses on the machine learning of astrophysics, he is working and collaborating on building the neural networks for active galactic nuclei, cosmology, gamma-ray burst and gravitational wave. Different from the traditional methodologies of understanding the nature either by proposing a theory or by summarizing the observations, he is willing to promote the novel methodology that human understands the nature by understanding the machine which looks at the big data and generates its intuition as physical laws.

EDUCATION AND WORK

SOUTHEAST UNIVERSITY

Nanjing, China — Bachelor Degree — 2003 - 2007

PURPLE MOUNTAIN OBSERVATORY, CHINESE ACADEMY OF SCIENCES NANJING UNIVERSITY (FOR LESSONS)

Nanjing, China — Master Degree — 2008 - 2011

UNIVERSITY OF ROME - SAPIENZA

INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS (ICRANET)
Italy — Tenth Cycle, 2011-2014, of IRAP PhD

INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS (ICRANET)
Italy — Researcher, 2015 - Present

NATIONAL INSTITUTE FOR ASTROPHYSICS (INAF)
Italy — Associator, 2019 – Present

SCIENTIFIC WORK

Yu Wang has published more than 40 papers, and participated in about 20 GCN observation reports, his two catalogues have been included in the VizieR Catalog. His publications are on theoretical and data observations of gamma-ray bursts, black hole physics, gravitational waves and their

electromagnetic counterparts, satellite data processing, and studying many areas of astrophysics by machine learning.

Xue She-Sheng



Position: ICRANet Faculty

Period covered: 2020 -- 2021

I Scientific Work

Kerr black hole in an external magnetic field, and strongly pulsating electromagnetic field in gravitational collapse and heavy atoms, as well as their relevance to Gamma-Ray Bursts (GRBs) physics.

Strong electromagnetic field in compact stars and heavy atoms and its relevance to their structure and properties.

Pair production rates and radiation in strong and time-varying electromagnetic fields, and its applications in physics and astrophysics.

Pair production and interactions of fields and matter in the cosmological evolution within the framework of Einstein-Maxwell theory.

Four-fermion interactions of Einstein-Cartan theory and its resulted particle spectra for matter and dark matter.

The opacity of high energy cosmic particles in terms of their energy and travelling distance.

See the following list of publications.

II Conferences and educational activities

(II a) Conferences and Other External Scientific Work

Participating the organizations of ICRANet meetings in Korea and China: the 17th Italian-Korean meeting (August 2- 6, 2021, online meeting), ICRANet-ISFAHAN Astronomy Meeting (November 3- 5, 2021, online meeting), and Sixteenth Marcel Grossmann Meeting - MG16 (Virtual Meeting - July 5- 10, 2021).

Participating the preparation of ICRANet agreements with Institutions of China (2018-2021).

(II b) Work With Students and young researchers

Stefanon, Campion, Wang Yu, Rahim Moradi, Li Liang and Luis Gabriel Gómez Díaz, David Melon Fuksman, Yu Ling Chang, Maryam Amiri, B. Elsan, Panah and Rashid Riahi, Seddigheh Tizchang, Somayye Mahmoudi, as well as Takahiro Hayashinaka, Sehar Ajmal, Li-Yang Gao, Ze-Wei Zhao, YunLong Zheng, Sareh Eslamzadeh Askestani (supported by their nations).

(II c) Diploma thesis supervision (2012-2021)

Stefanon, Campion, Yuanbin Wu, Handrik Ludwig, Eckhard Strobel, and Clement Stahl (all are Erasmus Mundus Ph.D. students), their main publications: 12 in Phys. Rev. , and 6 in Nucl. Phys., Phys. Lett.

(II d) Other Teaching Duties (2012-2021)

Teaching courses in Nice and Les Houches schools for IRAP Ph.D. Erasmus Mundus students.

(II e) Work With Professors and Postdocs inside and outside ICRANet (2012-2021)

R. Ruffini, H. Kleinert, G. Vereshchagin, J. Rueda, C. Bianco, W.B. Han, I. Siutsou, C. Argulles, C. Gruber, M. Zarei, M. Abdi, R. Mohammadi, D. Bégué, E. Bavarsad and Sang Pyo Kim, S. Shakeri, F. Hajkarim, F. Romeo, O. Panella, R. Leonardi, S. Hao. A. Gurrola, M. Haghighat, David J. E. Marsh, C.-J. Xia, R.-X. Xu, S.-G. Zhou, D. Gregoris, T. Adormo, Daniele Gregoris, Xin Zhang

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

Participating organization of ICRANet Seminars and ICRANet outreach activity.
Participating preparation of ICRANet Newsletter and activity report. Working with ICRANet secretary administration.

III b. Outside ICRANet

Visiting Chinese Institutions IHE, ITP, and USTC CAS as well as Tsinghua University, Sun Yet-San University and Hang Zhou University of technology that are in cooperation with ICRANet .

IV. Other

The List of Publications (2020 -- 2021)

R. Moradi, J. A. Rueda, R. Ruffini, Liang Li, C. L. Bianco, S. Campion, C. Cherubini, S. Filippi, Y. Wang, S. S. Xue, `` Nature of the ultrarelativistic prompt emission phase of GRB 190114C", Phys. Rev. D 104, 063043 (2021), <https://arxiv.org/abs/2110.12410>

R Ruffini, R Moradi, J A Rueda, L Li, N Sahakyan, Y-C Chen, Y Wang, Y Aimuratov, L Becerra, C L Bianco, C Cherubini, S Filippi, M Karlica, G J Mathews, M Muccino, G B Pisani, S.- S. Xue, `` The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs", Monthly Notices

of the Royal Astronomical Society, Volume 504, Issue 4, July 2021, Pages 5301–5326, <https://arxiv.org/abs/2103.09142>

R. Ruffini, et.al. `` Self-similarity and power-laws in GRB 190114C ", arXiv:1904.04162 and ``Self-Similarities and Power-laws in the Time-resolved Spectra of GRB 190114C, GRB 130427A, GRB 160509A, and GRB 160625B" arXiv:1910.12615; `` On the role of the Kerr-Newman black hole in the GeV emission of long gamma-ray bursts " arXiv:1803.05476.

M. Haghigat, S. Mahmoudi, R. Mohammadi, S. Tizchang and S.S. Xue, `` Circular polarization of cosmic photons due to their interactions with Sterile neutrino dark matter", Phys. Rev. D 101, 123016 (2020) <https://arxiv.org/abs/1909.03883>

M. Abdi, R. Mohammadi, S.-S. Xue, M. Zarei , ``Distinguishing Dirac from Majorana neutrinos in a microwave cavity", <https://arxiv.org/abs/1909.01536>

R. Leonardi, O. Panella, F. Romeo, A. Gurrola, H. Sun, S.-S. Xue
“Phenomenology at the LHC of composite particles from
strongly interacting Standard Model fermions via four-fermion operators of
NJL type ”, The European Physical Journal C volume 80, Article number: 309
(2020), <https://arxiv.org/abs/1810.11420>

S.-S. Xue “Cosmological constant, matter, cosmic inflation and coincidence”,
Modern Physics Letters A, (2020) 2050123 <https://arxiv.org/abs/2004.10859>

S.-S. Xue, `` Cosmological Lambda driven inflation and produced particles ",
<https://arxiv.org/abs/1910.03938>.

S.-S. Xue “Cosmological Lambda converts to reheating energy and cold dark
matter ”, <https://arxiv.org/abs/2006.15622>

S.-S. Xue “Horizon crossing causes baryogenesis, magnetogenesis and
dark-matter acoustic wave ”, <https://arxiv.org/abs/2007.03464>

S. Shakeri, David J. E. Marsh, and S.-S. Xue
`` Light by Light Scattering as a Probe for Axion Dark Matter", <https://arxiv.org/abs/2002.06123>

S. Shakeri, F. Hajkarim, S.-S. Xue “Shedding New Light
on Sterile Neutrinos from XENON1T Experiment ”, JHEP12 (2020) 194,
<https://arxiv.org/abs/2008.05029>

C.-J. Xia, S.-S. Xue, R.-X. Xu, S.-G. Zhou “Supercritically
charged objects and electron-positron pair creation ”, Phys. Rev. D 101, 103031
(2020), <https://arxiv.org/abs/2001.03531>

S.-S. Xue “Spontaneous Peccei-Quinn symmetry breaking renders sterile
neutrino, axion and χ boson to be candidates for dark matter particles ”,
<https://arxiv.org/abs/2012.04648>

S.-S. Xue “Gravo-thermal catastrophe in gravitational collapse ”, JCAP07 (2021) 044
<https://arxiv.org/abs/2104.03021>

S.-S. Xue “Massive particle pair production and oscillation in Friedman
Universe: its consequence on inflation”,
<https://arxiv.org/abs/2112.09661>

Li-Yang Gao, Ze-Wei Zhao, She-Sheng Xue, Xin Zhang “Relieving the H_0 tension with a new interacting dark energy model”, JCAP 07 (2021) 005, <https://arxiv.org/abs/2101.10714>

S. Campion, J. A. Rueda, S. S. Xue, R. Ruffini, “Magnetic field screening process in a Kerr Black Hole”, Astronomy Reports, 2021, Vol. 98, No. 1, and Physics Letters B, Volume 820, 10 September 2021, 136562 <https://arxiv.org/abs/2002.11681>

Adjunct Professors of the Faculty

Aimuratov Yerlan

Position current: researcher at Fesenkov Astrophysical Institute, Almaty, Kazakhstan

Position former: EMJD IRAP V cycle PhD student at Sapienza University of Rome (defended 25.02.2020)

Period covered: January-December 2021



I Scientific Work

GRB, GRB-SN, Wolf-Rayet stars: observation and analysis

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- *THESEUS Conference 2021, 23-26 March 2021 (on-line)*
- *Virtual OPTICON Archival School using ESO and ALMA data, 19-26 June 2021 (on-line)*
- *Sixteenth Marcel Grossmann Meeting, 5-10 July 2021 (on-line)*
- *“Scientific Communication in Astronomy” training school, 3-8 October 2021, Bertinoro, Italy (in-person)*
- *IAU Symposium 366 “The Origin of Outflows in Evolved Stars”, 1-5 November 2021, Leuven, Belgium (on-line)*
- *ICRANet-ISFAHAN Astronomy Meeting, 3-5 November 2021, Isfahan, Iran (on-line)*
- *Amati Fest, 6-7 December 2021, ICRANet-Pescara (on-line)*

II b Work With Students

- *none*

II c Diploma thesis supervision

- *Tursynbek Yernazarov (al-Farabi Kazakh National University)*

II d Other Teaching Duties

- *Intro to Nuclear Astrophysics (al-Farabi Kazakh National University)*

II e. Work With Postdocs

- *GRB-SN with ICRANet postdocs Rahim Moradi and Liang Li*

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

- *participation and oral talk “GeV-GRB-SN: compare and contrast”, Sixteenth Marcel Grossmann Meeting, 5-10 July 2021 (on-line)*

- *participation and oral talk “Universality of Peaking Time of Supernovae Associated with Gamma-Ray Bursts”, ICRANet-ISFAHAN Astronomy Meeting, 3-5 November 2021, Isfahan, Iran (on-line)*
- *participation, Amati Fest, 6-7 December 2021, ICRANet-Pescara (on-line)*

III b. Outside ICRANet

- *monthly scientific seminars at Fesenkov Astrophysical Institute*
- *seminars at al-Farabi Kazakh National University*

IV. Other

- *visiting scientist at ICRANet-Pescara, October 2021*

2021 List of Publication

- <https://orcid.org/0000-0001-5717-6523>

Ansoldi Stefano

Position: Researcher, permanent, full time, University of Udine
Period covered:



I Scientific Work

1. Vacuum decay with wormhole creation, and its effects in the early universe (in collaboration with Takahiro Tanaka)
2. Study of horizonless, rotating black-hole mimickers (in collaboration with Anna Zulianello, Raul Carballo-Rubio, Stefano Liberati)
3. First steps into numerical relativity simulations (performed on the HPC CINECA cluster, in a joint collaboration, at the university of Trieste, with Agata Trovato, Andrea Virtuoso, Edoardo Milotti, Enrico Fragiaco, Odysse Halim)
4. Machine learning approaches to detect quasinormal modes in gravitational waves signals
5. Maintenance of an automated Fermi data analysis and alert system for target of observations in very high energy gamma rays (MA4U, Magic Automated Analyzing And Alerting Unit)
6. Upgrade and maintenance of MPSS (MAGIC Proposal Submission System), a WEB tool for submission of observation proposals to the MAGIC telescope

II Conferences and educational activities

II c Diploma thesis supervision

Undergraduate thesis

Daniele Berti (supervisor): *Field Equations of $f(R)$ Theories of Gravity (in Italian, "Le equazioni di campo delle teorie $f(R)$ della gravità)*

Master thesis

1. Marco Cusinato (co-supervisor, in collaboration with Albino Perego): "*Quantitative Characterization of Neutrino Luminosity in Numerical Simulations of Binary Neutron Star Mergers*"
2. Cristian Gusella (supervisor): *Eddington-inspired-Born-Infeld (EiBI) Gravity*
3. Francesco Pisani (co-supervisor, in collaboration with Daniele Oriti): *Holonomy Operators in the Group Field Theory approach to Quantum Gravity*

4. Alessandro Armando Vigliano (supervisor, in collaboration with Francesco Longo): *Gamma Ray Burst Polarization Studies with AMEGO*
5. Alessandro Longo (co-supervisor, in collaboration with Miguel Zumalacarregui and Giovanni Tambalo): *Backreaction Mechanism in Cubic Galileon Cosmology*
6. Luca Belpietro (supervisor): *Implications on the PBH scenario from the second LIGO--Virgo Gravitational--Wave Transient Catalog*
7. Jacopo Salvalaggio (co-supervisor, in collaboration with Giovanni Cabass): *Robustness of mixed scalar-tensor correlators in the EFT of inflation*
8. Lucio De Simone (supervisor): *Fundamental ideas and modern developments in perturbative quantum gravity*
9. Alberto Ghedin (internal advisor, supervisor: Bruno Giacomazzo): *General Relativistic Simulations of Binary Neutron Star Mergers*

II d Other Teaching Duties

Supervisor of about 15 internships (at the undergraduate and master level) about theoretical physics, differential geometry, gravitational physics, mathematical physics

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III b. Outside ICRANet

1. General Relativity (within the joint master course between the universities of Trieste and Udine)
2. Advanced General Relativity (within the joint master course between the universities of Trieste and Udine)

IV. Other

2021 List of Publication

1. **Electromagnetic tests of horizonless rotating black hole mimickers**, Anna Zulianello, Raul Carballo-Rubio, Stefano Liberati, Stefano Ansoldi, e-Print: [2005.01837](https://arxiv.org/abs/2005.01837) [gr-qc], DOI: [10.1103/PhysRevD.103.064071](https://doi.org/10.1103/PhysRevD.103.064071), Published in: Phys.Rev.D 103 (2021) 6, 064071

2. **Neutrino emission from binary neutron star mergers: characterizing light curves and mean energies**, Marco Cusinato, Federico Maria Guercilena, Albino Perego, Domenico Logoteta, David Radice, Sebastiano Bernuzzi, Stefano Ansoldi, e-Print: [2111.13005](#) [astro-ph.HE]
3. **Narrowband searches for continuous and long-duration transient gravitational waves from known pulsars in the LIGO-Virgo third observing run**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2112.10990](#) [gr-qc]
4. **Tests of General Relativity with GWTC-3**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2112.06861](#) [gr-qc]
5. **All-sky search for gravitational wave emission from scalar boson clouds around spinning black holes in LIGO O3 data**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.15507](#) [astro-ph.HE]
6. **Search of the Early O3 LIGO Data for Continuous Gravitational Waves from the Cassiopeia A and Vela Jr. Supernova Remnants**, LIGO Scientific and VIRGO Collaborations • R. Abbott et al., e-Print: [2111.15116](#) [gr-qc]
7. **Combined searches for dark matter in dwarf spheroidal galaxies observed with the MAGIC telescopes, including new data from Coma Berenices and Draco**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2111.15009](#) [astro-ph.HE]
8. **Searches for Gravitational Waves from Known Pulsars at Two Harmonics in the Second and Third LIGO-Virgo Observing Runs**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.13106](#) [astro-ph.HE]
9. **Multiwavelength study of the gravitationally lensed blazar QSO B0218+357 between 2016 and 2020**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2111.12926](#) [astro-ph.HE]
10. **Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift During the LIGO-Virgo Run O3b**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.03608](#) [astro-ph.HE]
11. **Constraints on the cosmic expansion history from GWTC-3**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.03604](#) [astro-ph.CO]
12. **The population of merging compact binaries inferred using gravitational waves through GWTC-3**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.03634](#) [astro-ph.HE]
13. **GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.03606](#) [gr-qc]
14. **All-sky, all-frequency directional search for persistent gravitational-waves from Advanced LIGO's and Advanced Virgo's first three observing runs**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2110.09834](#) [gr-qc]
15. **Search for subsolar-mass binaries in the first half of Advanced LIGO and Virgo's third observing run**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2109.12197](#) [astro-ph.CO]
16. **Observation of the Gamma-Ray Binary HESS J0632+057 with the H.E.S.S., MAGIC, and VERITAS Telescopes**, VERITAS and MAGIC and H.E.S.S. Collaborations • C.B. Adams et al., e-Print: [2109.11894](#) [astro-ph.HE], DOI: [10.3847/1538-4357/ac29b7](#), Published in: *Astrophys.J.* 923 (2021) 2, 241
17. **Search for continuous gravitational waves from 20 accreting millisecond X-ray pulsars in O3 LIGO data**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2109.09255](#) [astro-ph.HE]
18. **Searching for VHE gamma-ray emission associated with IceCube neutrino alerts using FACT, H.E.S.S., MAGIC, and VERITAS**, VERITAS and MAGIC and IceCube and H.E.S.S. and FACT Collaborations • Victor A. Acciari et al., e-Print: [2109.04350](#) [astro-ph.HE], DOI: [10.22323/1.395.0960](#), Published in: *PoS ICRC2021* (2021), 960

19. **Search for Very High-energy Emission from the Millisecond Pulsar PSR J0218+4232**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2108.11373](#) [astro-ph.HE], DOI: [10.3847/1538-4357/ac20d7](#), Published in: *Astrophys.J.* 922 (2021) 2, 251
20. **Cross-calibration and combined analysis of the CTA-LST prototype and the MAGIC telescopes**, CTA LST Project and MAGIC Collaborations • Yoshiki Ohtani et al., e-Print: [2108.05140](#) [astro-ph.IM], DOI: [10.22323/1.395.0724](#), Published in: *PoS ICRC2021* (2021), 724
21. **GWTC-2.1: Deep Extended Catalog of Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run**, LIGO Scientific and VIRGO Collaborations • R. Abbott et al., e-Print: [2108.01045](#) [gr-qc]
22. **All-sky search for long-duration gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run**, KAGRA and VIRGO and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2107.13796](#) [gr-qc], DOI: [10.1103/PhysRevD.104.102001](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 10, 102001
23. **First detection of VHE gamma-ray emission from TXS \hat{A} 1515-273, study of its X-ray variability and spectral energy distribution**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2107.09413](#) [astro-ph.HE], DOI: [10.1093/mnras/stab1994](#), Published in: *Mon.Not.Roy.Astron.Soc.* 507 (2021) 1, 1528-1545
24. **All-sky search for short gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run**, KAGRA and VIRGO and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2107.03701](#) [gr-qc], DOI: [10.1103/PhysRevD.104.122004](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 12, 122004
25. **Calibration of Advanced Virgo and reconstruction of detector strain $h(t)$ during the Observing Run O3**, VIRGO Collaboration • F. Acernese et al., e-Print: [2107.03294](#) [gr-qc]
26. **All-sky search for continuous gravitational waves from isolated neutron stars in the early O3 LIGO data**, KAGRA and VIRGO and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2107.00600](#) [gr-qc], DOI: [10.1103/PhysRevD.104.082004](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 8, 082004
27. **Observation of Gravitational Waves from Two Neutron Star-Black Hole Coalescences**, LIGO Scientific and KAGRA and VIRGO Collaborations • R. Abbott et al., e-Print: [2106.15163](#) [astro-ph.HE], DOI: [10.3847/2041-8213/ac082e](#), Published in: *Astrophys.J.Lett.* 915 (2021) 1, L5, *Astrophys.J.* 915 (2021) 1, L5
28. **Investigation of the correlation patterns and the Compton dominance variability of Mrk 421 in 2017**, MAGIC and FACT Collaborations • V.A. Acciari et al., e-Print: [2106.05516](#) [astro-ph.HE], DOI: [10.1051/0004-6361/202141004](#), Published in: *Astron.Astrophys.* 655 (2021), A89, *Astron.Astrophys.* 655 (2021), A89
29. **Search for intermediate mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo**, LIGO Scientific and Virgo and KAGRA Collaborations • Rich Abbott et al., e-Print: [2105.15120](#) [astro-ph.HE]
30. **Constraints on dark photon dark matter using data from LIGO's and Virgo's third observing run**, LIGO Scientific and Virgo and KAGRA Collaborations • R. et al., e-Print: [2105.13085](#) [astro-ph.CO]
31. **Searches for Continuous Gravitational Waves from Young Supernova Remnants in the Early Third Observing Run of Advanced LIGO and Virgo**, LIGO Scientific and VIRGO and KAGRA and Virgo Collaborations • R. Abbott et al., e-Print: [2105.11641](#) [astro-ph.HE], DOI: [10.3847/1538-4357/ac17ea](#), Published in: *Astrophys.J.* 921 (2021) 1, 80
32. **Search for Lensing Signatures in the Gravitational-Wave Observations from the First Half of LIGO-Virgo's Third Observing Run**, LIGO Scientific and VIRGO Collaborations • R. Abbott et al., e-Print: [2105.06384](#) [gr-qc], DOI: [10.3847/1538-4357/ac23db](#), Published in: *Astrophys.J.* 923 (2021) 1, 14

33. **Constraints from LIGO O3 Data on Gravitational-wave Emission Due to R-modes in the Glitching Pulsar PSR J0537+6910**, LIGO Scientific and Virgo and KAGRA Collaborations • R. Abbott et al., e-Print: [2104.14417](#) [astro-ph.HE], DOI: [10.3847/1538-4357/ac0d52](#), Published in: *Astrophys.J.* 922 (2021) 1, 71
34. **Broadband Multi-wavelength Properties of M87 during the 2017 Event Horizon Telescope Campaign**, Event Horizon Telescope and Fermi-LAT and H.E.S.S. and MAGIC and VERITAS and EAVN Collaborations • J.C. Algaba et al., e-Print: [2104.06855](#) [astro-ph.HE], DOI: [10.3847/2041-8213/abef71](#), Published in: *Astrophys.J.Lett.* 911 (2021) 1, L11, *Astrophys.J.* 911 (2021) 1, L11
35. **Search for anisotropic gravitational-wave backgrounds using data from Advanced LIGO and Advanced Virgo's first three observing runs**, KAGRA and Virgo and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2103.08520](#) [gr-qc], DOI: [10.1103/PhysRevD.104.022005](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 2, 022005
36. **Constraints on Cosmic Strings Using Data from the Third Advanced LIGO-Virgo Observing Run**, LIGO Scientific and Virgo and KAGRA Collaborations • R. Abbott et al., e-Print: [2101.12248](#) [gr-qc], DOI: [10.1103/PhysRevLett.126.241102](#), Published in: *Phys.Rev.Lett.* 126 (2021) 24, 241102
37. **Upper limits on the isotropic gravitational-wave background from Advanced LIGO and Advanced Virgo's third observing run**, KAGRA and Virgo and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2101.12130](#) [gr-qc], DOI: [10.1103/PhysRevD.104.022004](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 2, 022004
38. **Follow-up observations of GW170817 with the MAGIC telescopes**, MAGIC Collaboration • Om Sharan Salafia et al., DOI: [10.22323/1.395.0944](#), Published in: *PoS ICRC2021* (2021), 944
39. **Diving below the spin-down limit: Constraints on gravitational waves from the energetic young pulsar PSR J0537-6910**, LIGO Scientific and Virgo and KAGRA Collaborations • R. Abbott et al., e-Print: [2012.12926](#) [astro-ph.HE], DOI: [10.3847/2041-8213/abffcd](#), Published in: *Astrophys.J.* 913 (2021), L27
40. **All-sky search in early O3 LIGO data for continuous gravitational-wave signals from unknown neutron stars in binary systems**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2012.12128](#) [gr-qc], DOI: [10.1103/PhysRevD.103.064017](#), Published in: *Phys.Rev.D* 103 (2021) 6, 064017
41. **VHE gamma-ray detection of FSRQ QSO B1420+326 and modeling of its enhanced broadband state in 2020**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2012.11380](#) [astro-ph.HE], DOI: [10.1051/0004-6361/202039687](#), Published in: *Astron.Astrophys.* 647 (2021), A163
42. **H.E.S.S. and MAGIC observations of a sudden cessation of a very-high-energy gamma-ray flare in PKS 1510+089 in May 2016**, H.E.S.S. and MAGIC Collaborations • H. Abdalla et al., e-Print: [2012.10254](#) [astro-ph.HE], DOI: [10.1051/0004-6361/202038949](#), Published in: *Astron.Astrophys.* 648 (2021), A23
43. **MAGIC Observations of the Nearby Short Gamma-Ray Burst GRB160821B**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2012.07193](#) [astro-ph.HE], DOI: [10.3847/1538-4357/abd249](#) (publication), Published in: *Astrophys.J.* 908 (2021) 1, 90
44. **Multiwavelength variability and correlation studies of Mrk 421 during historically low X-ray and gamma-ray activity in 2015-2016**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2012.01348](#) [astro-ph.HE], DOI: [10.1093/mnras/staa3727](#), Published in: *Mon.Not.Roy.Astron.Soc.* 504 (2021) 1, 1427-1451
45. **Tests of general relativity with binary black holes from the second LIGO-Virgo gravitational-wave transient catalog**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2010.14529](#) [gr-qc], DOI: [10.1103/PhysRevD.103.122002](#), Published in: *Phys.Rev.D* 103 (2021) 12, 122002

46. **Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2010.14533](https://arxiv.org/abs/2010.14533) [astro-ph.HE], DOI: [10.3847/2041-8213/abe949](https://doi.org/10.3847/2041-8213/abe949), Published in: *Astrophys.J.Lett.* 913 (2021) 1, L7
47. **Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift During the LIGO-Virgo Run O3a**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2010.14550](https://arxiv.org/abs/2010.14550) [astro-ph.HE], DOI: [10.3847/1538-4357/abee15](https://doi.org/10.3847/1538-4357/abee15), Published in: *Astrophys.J.* 915 (2021) 2, 86
48. **GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2010.14527](https://arxiv.org/abs/2010.14527) [gr-qc], DOI: [10.1103/PhysRevX.11.021053](https://doi.org/10.1103/PhysRevX.11.021053), Published in: *Phys.Rev.X* 11 (2021), 021053
49. **Open data from the first and second observing runs of Advanced LIGO and Advanced Virgo**, LIGO Scientific and Virgo Collaborations • Rich Abbott et al., e-Print: [1912.11716](https://arxiv.org/abs/1912.11716) [gr-qc], DOI: [10.1016/j.softx.2021.100658](https://doi.org/10.1016/j.softx.2021.100658), Published in: *SoftwareX* 13 (2021), 100658

ARGÜELLES CARLOS RAÚL



Position: ICRANet Adjunct professor of the Faculty; Researcher (permanent position) at CONICET (IALP-UNLP)– Argentina
Period covered: 2021

I Scientific Work

Theoretical and phenomenological aspects of particle Dark Matter, self-gravitating systems, Numerical Relativity, Galactic Dynamics, Cosmology, Neutrino Physics beyond standard model.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Invited speaker at the IFT seminars at UAM, Madrid - (Online Meeting), April 22, 2021

Invited Plenary speaker and member of the International Coordinating Committee at the 16th Marcel Grossmann Meeting MG16 – Rome, Italy, July 5 –10, 2021

Invited parallel session speaker (DM 1) and at the 16th Marcel Grossmann Meeting MG16 – Rome, Italy, July 5 –10, 2021

Invited round table speaker together with the Nobel Prize in Physics 2020, at the 16th Marcel Grossmann Meeting MG16 – Rome, Italy, July 5 –10, 2021

Invited speaker at the 17th Italian-Korean Symposium for Relativistic Astrophysics - (Online Meeting), August 02 –06, 2021

Invited speaker at the first ICRANet-ISFAHAN Astronomy Meeting: From the Ancient Persian Astronomy to Recent Developments in Theoretical and Experimental Physics, Astrophysics and General Relativity - (Online Meeting), November 03 –05, 2021

Invited Seminar speaker at the Observatoire astronomique de Strasbourg, France - November 03, 2021

II b Work With Students

Master in Science Thesis supervisor of two graduate students from Argentina (Ms. Valentina Crespi – UNLP, and Ms. Carolina Millauro - UBA). Area: Physics. Period 2021.

II c Diploma thesis supervision

Ph.D Thesis director of Dr. Rafael Yunis - IRAP PH.D. 16TH CICLE (La Sapienza Università di Roma).

Ph.D Thesis director of Mr. Santiago Collazo – Beca doctoral CONICET, Argentina.

II d Other Teaching Duties

Assistant Professor position in Theoretical Physics at La Plata National University (UNLP – Physics department)

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

Adjunct professor of the Faculty. Scientific collaborator with the Astroparticle Physics and Dark Matter group.

III b. Outside ICRANet

Researcher (permanent position) at CONICET – Argentina. Working place: IALP - UNLP, La Plata, Argentina. Paseo del Bosque, Casco Urbano, B1900FWA La Plata, Buenos Aires. Phone: +54 0221 4236593 Int. 1052. Teaching activities as Assistant Professor at UNLP. Master in Science Thesis advisor and Ph.D thesis advisor.

IV. Other

2021 List of Publication

1- Becerra-Vergara, E. A.; Argüelles, C. R.; Krut, A.; Rueda, J. A.; Ruffini, R., “Hinting a dark matter nature of Sgr A* via the S-stars”, Monthly Notices of the Royal Astronomical Society 505 (2021), issue 1, pp L64-L68.

2- Argüelles, Carlos R.; Mestre, M. F.; Becerra-Vergara, E. A.; Crespi, V.; Krut, A.; Rueda, J. A.; Ruffini, R., “What does lie at the Milky Way centre? Insights from the S2 star orbit precession”, Monthly Notices of the Royal Astronomical Society, accepted for publication (2021), doi:10.1093/mnras/ab126.

- 3-** Argüelles, Carlos R.; Díaz, Manuel I.; Krut, Andreas; Yunis, Rafael, “On the formation and stability of fermionic dark matter halos in a cosmological framework”, *Monthly Notices of the Royal Astronomical Society*, 502 (2021), issue 3, pp 4227-4246.
- 4-** Yunis, R. I; Argüelles, C. R., Scóccola, C. G.; Nacir, D. L.; Giordano, G. “Self Interactions in Warm Dark Matter: A View from Cosmological Perturbation Theory”, *Astronomy Reports* 65 (2021) issue 10, pp 1068-1073.

Becerra Bayona Laura Marcela

Position: Adjunct professor
Period covered: 2021-present



I Scientific Work

I have worked on the Induced Gravitational Collapse (IGC) paradigm in which a carbon-oxygen core explodes in a Type Ib/c supernovae in presence of a close neutron star companion. The supernovae triggers an hypercritical accretion into the neutron star and depending of the initial binary parameters the system can have different fates. In a first scenario, also referred as binary-driven hypernova (BdHNe), the binary is enough bound, so the accretion rate to NS allows to it reaches its critical mass, and collapse to a black hole with a GRB emission. A second scenario can happen for binary systems with larger binary separations, then the hypercritical accretion onto the NS is not sufficient to induced its gravitational collapse. Instead of a GRB emission, a X-ray flash (XRF) is produced. I have worked on the hypercritical accretion process, following the evolution of the NS, in order to characterized the observational signatures in each scenario.

I have also worked on the evolution of postmergers remnants of white dwarfs binary systems. The simulations of coalescence between white dwarfs have shown that the final result consists of a central remnant made of the undisturbed primary star. The secondary star is totally disrupted and about half of the material is accreted by the primary, forming a hot corona surrounding it, and the rest of the material forms a rapidly rotating Keplerian disk, since little mass is ejected from the system during the coalescence process. I have modelled the evolution of this last system, exploring the different initial conditions that allows to the white dwarfs collapse to a neutron star or explode as a Type Ia supernovae.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- *IRAP Ph.D. Erasmus Mundus Workshop*, Supernovae, Gamma-ray bursts and the induced gravitational collapse, May 11th–16th, 2014 Les Houches (France). Asistant.
- *1st Scientific ICRANet Meeting in Armenia: Black Holes: the largest energy sources in the Universe*, June 30th –July 4th, 2014. Yerevan, Armenia. Asistant
- *Third Bego Rencontres. IRAP Ph.D. Erasmus Mundus school*. September 8th-19th, 2014 . “Hypercritical Accretion in Binary-Driven Hypernova”. L. Becerra, J. Rueda and R. Ruffini
- *Conference Swift 10 Years of Discovery*. Rome, Italy. Decembre 1st-5th, 2014. “Hypercritical Accretion, Induced Gravitational Collapse, and Binary-Driven Hypernova”. L. Becerra, et. al.

- The Second ICRANet César Lattes Meeting. Rio de Janeiro, Brasil. April 13rd-18th, 2015. “Angular Momentum Transfer During the Hypercritical Accretion in Binary-Driven-Hypernova” L. Becerra, F. Cippolletta, F. Fryer, J. Rueda and R. Ruffini.
- Fourteenth Marcel Grossmann Meeting – MG14. Rome, Italy. July 12nd-18th, 2015:
 “Angular Momentum Transfer Role in the Hypercritical Accretion of Binary-Driven-Hypernova” L. Becerra, F. Cippolletta, F. Fryer, J. Rueda and R. Ruffini.
 “Induced compression by angular momentum loss in fast rotating, magnetized Super-Chandrasekhar white dwarfs” L. Becerra, E. Garcia-Berro, P. Loren-Aguilar and J. Rueda
- Supernovae, Hypernovae and Binary Driven Hypernovae. An Adriatic Workshop. Pescara, Italy. July 20-30, 2016:
 1. “The spin evolution of fast rotating, magnetized super-Chandrasekhar white dwarfs in the aftermath of white dwarfs mergers” L. Becerra, E. Garcia-Berro, P. Loren-Aguilar and J. Rueda.
 2. “On the induced gravitational collapse scenario of gamma-ray bursts associated with supernova”. L. Becerra, C. L. Biando, C. Fryer, J. A. Rueda, R. Ruffini.
 - XV Latin American Regional IAU Meeting (LARIM). Cartagena, Colombia. October 3-7/2016. “Hypercritical Accretion in the Induced Gravitational Collapse” L. Becerra, C. L. Biando, C. Fryer, J. A. Rueda, R. Ruffini.
 - The 2017 Annual meeting of the Division of Gravitation and Relativistic Astrophysics of the Chinese Physical Society - Fifth Galileo-Xu Guangqai Meeting. Chengdu, China. June 25-30, 2017. “SPH simulations of the induced gravitational collapse scenario”. L. Becerra, C. L. Bianco, F. Fryer, J. A. Rueda and R. Ruffini
 - International Conference on Gravitation: Joint Conference of ICGAC-XIII and IK15. Seoul, Korea. July 3-7, 2017. “On the induced gravitational collapse”. L. Becerra, C. L. Bianco, F. Fryer, J. A. Rueda and R. Ruffini.
 - THESEUS (Transient High Energy Sky and Early Universe Surveyor) Workshop, Naples, Italy. October 5-6, 2017. “On the induced gravitational collapse scenario”. L. Becerra, C. L. Bianco, F. Fryer, J. A. Rueda and R. Ruffini.

2021 List of Publication

- L. Becerra, A. Reisenegger, J. Alejandro Valdivia, and M. E. Gusakov. Evolution of random initial magnetic fields in stably stratified and barotropic stars. arXiv e-prints, page arXiv:2111.10673, Nov. 2021, 2111.10673.
- R. Ruffini, R. Moradi, J. A. Rueda, L. Li, N. Sahakyan, Y. C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B. Pisani, and S. S. Xue. The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs. Mon. Not. Roy. Astr. Soc., 504(4):5301–5326, July 2021, arXiv: 2103.09142.

Bini Donato



Position: Current

Research Director (permanent position) at
Istituto per le Applicazioni del Calcolo “M. Picone,” CNR
Via dei Taurini, 19 I-00185 Roma (IT).

I Scientific Work

The main topic of my interest is General Relativity, with special attention to classical aspects.

In particular, I'm interested in: analysis and interpretation of exact solutions of Einstein's field equations, spacetime splitting techniques, measurement process and the role of the observer in General Relativity, particle dynamics in certain fixed gravitational backgrounds (either test particles with scalar structure: the mass, or particles with internal structure: spinning test particles and particles with multipolar structure, quadrupolar and beyond), gravitational perturbations, gravitational waves. Currently, the main topics of interest for my research activities involve the PN approximation of General Relativity, gravitational self-force, effective-one-body model, with applications to binary systems.

I'm an expert user of MAPLE™ tensor calculus package.

II Conferences and educational activities

Conferences and Other External Scientific Work

Since 1988 I have participated in all the international meetings of the Marcel Grossmann series as well as all the conferences of the ICRA- ICRANet series.

From 2016 I'm attending the Capra Meetings of the gravitational self-force community and as well as all meeting involving Post-Newtonian approximation, Post-Minkowskian approximation, Effective Field Theory and Effective One-Body approach.

Diploma thesis supervision

I've been supervisor of the Diploma thesis of several students at the University of Rome “La Sapienza”, since 1995:

G. Spoliti, A. Merloni, C. Germani, C. Cherubini, G. Miniutti, G. Cruciani, A. Geralico, A. Lunari, M. De Mattia, D. Gregoris.

Ph.D thesis supervision

Dr. V. Montaquila, Physics departments of the University of Naples “Federico II.,” year 2011.
Dr. M. Haney, IRAP Ph.D, University of Rome "Sapienza," year 2013.
Gabriel G. Carvalho (CAPES, Brazil and ICRANet), year 2016.

Teaching experiences

I'm Contract Professor of Physics since 2004 at the faculty of Medicine of the University Campus Biomedico, in Rome. From 2007-2009 I have also been Contract Professor of Physics at the Nursery School of the same university. I've been teaching monographic courses at various Ph.D. schools in Italy.

Work with associate researchers

A Geralico (Istituto per le Applicazioni del Calcolo “M. Picone,” CNR, Rome, Italy)

III Service activities

Scientific collaboration with:

Prof. R.T. Jantzen (Villanova University, USA and ICRANet);

Outside ICRANet

Scientific collaboration with:

Prof. T. Damour (IHES, Paris, France).

Other

For the years 2002-2004 I have been the leader of a collaboration project between the Italian Research Council (CNR) and the analogous institution in Venezuela. Title of the project: Construction of 3d numerical models for the study of magnetohydrodynamics in gravitational physics and astrophysics. For the years 2007-2008 I have been the leader of young researchers projects of INDAM (Istituto Nazionale di Alta Matematica). Title of the project: Light coordinates and spacetime topography. For the years 2008-2009 I have been the leader of young researchers projects of INDAM (Istituto Nazionale di Alta Matematica). Title of the project: Sistemi di Posizionamento Globale relativistici

I'm currently doing referee activity for a large number of international journals in the field of General Relativity and I'm a reviewer for Mathreview.

For the years 2017, 2018 and 2019 I've been awarded as Outstanding Referee from the journal Classical and Quantum Gravity (IOP).

In the year 2021 I've been awarded as Outstanding Referee from the American Physical Society.

2021 List of publications

1) Salucci P, et al.,
Einstein, Planck and Vera Rubin: Relevant Encounters Between the Cosmological and the Quantum Worlds,
Frontiers in Astronomy and Space Sciences,
8:603190, 2021
doi: 10.3389/fphy.2020.603190
White Paper of the INFN collaboration QGSKY
e-print: arXiv:2011.09278

2) Bini D., Damour T., Geralico A., Laporta S. and Mastrolia P.
Gravitational scattering at the seventh order in G : nonlocal contribution at the sixth post-Newtonian accuracy,
Phys. Rev. D, 103, No. 4, 044038 (2021)
e-print: [arXiv:2012.12918 [gr-qc]].
DOI: 10.1103/PhysRevD.103.044038

3) Bini D., Esposito G.,
Investigating new forms of gravity-matter couplings in the gravitational field equations
Phys. Rev. D, 103, 064030 (2021)
e-print: [arXiv:2101.09771 [gr-qc]]
DOI: 10.1103/PhysRevD.103.064030

4) Bini D., Damour T., Geralico A.
Radiative contributions to gravitational scattering,
Phys. Rev. D 104, no.8, 084031 (2021)
doi:10.1103/PhysRevD.104.084031
e-print: [arXiv:2107.08896 [gr-qc]].

5) Bini D., Geralico A.
Frequency domain analysis of the gravitational wave energy loss in hyperbolic encounters
Phys. Rev. D, 104, 104019 (2021)
doi:10.1103/PhysRevD.104.104019
e-print: [arXiv:2108.02472 [gr-qc]].

6) Bini D., Geralico A.
Higher-order tail contributions to the energy and angular momentum fluxes in a two-body scattering process
Phys. Rev. D, 104, 104020 (2021)
doi:10.1103/PhysRevD.104.104020
e-print: [arXiv:2108.05445 [gr-qc]].

Submitted papers

7) Bini D., Geralico A., R. T. Jantzen
Strengthening the notion of Petrov type I spacetimes
General Relativity and Gravitation, submitted 2021
e-Print: [arXiv:2111.01283 [gr-qc]]

8) Bini D., Mashhoon B., Obukhov Y. N.
Gravitomagnetic Helicity
Phys. Rev. D, submitted (2021)
e-print: [arXiv:2112.07550 [gr-qc]].

Thomas Buchert



Position: Professor of Cosmology

Staff Member of CREAL, Head of Cosmology Group :
Université Lyon 1 and École Normale Supérieure Lyon
Adjunct Professor of the Faculty : ICRANet
Member of Euclid and 4MOST
PI: ERC advanced Grant ARThUs

Period covered: January 2021 - December 2021

I Scientific Work

- (i) Comparison of Lagrangian perturbation schemes with exact solutions in GR.
- (ii) CMB analysis and new statistics to detect the topology of the Universe.
- (iii) Analysis of SDSS data using Minkowski Functionals.
- (iv) Averaging formalism on the light cone.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Research School CIRM: [Theory of Gravitation and Variation in Cosmology \(1st edition\)](#), Marseille, France (SOC)
- Workshop ERC ARTHUS Roundtable VI and VII, Lyon, France (LOC)
- Research School CIRM: [Theory of Gravitation and Variation in Cosmology \(2nd edition\)](#), Marseille, France (SOC)

II b Work With Students

2 PhD students (1 ongoing) :

Quentin Vigneron finalized. Martin France (ongoing).

II c Diploma thesis supervision:

2 Master students Master1: Antonin Borderies, ENS and Master2: Alfred Bovon, ENS ;

II d Other Teaching Duties see below.

II e. Work With Postdocs :

Collaboration with Pratyush Pranav, Léo Brunswic, Nezihe Uzun, Asta Heinesen, ERC postdocs, financed by the ERC advanced Grant "ARTHUS, PI: T. Buchert". Collaboration with Jan. J. Ostrowski (Warsaw), Ismael Delgado Gaspar (Mexico), Stephen Appleby (South Korea).

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet : Coordination of talk by N. Uzun at MG16.

III b. Outside ICRANet :

Management of ERC advanced grant "ARTHUS, PI: T. Buchert", since September 2017.

Exercises in "Introduction to General Relativity", École Normale Supérieure, Lyon.

Exercises in "Fluidmechanics", Université Lyon 1.

Tutorials for future teachers at École Normale Supérieure, Lyon.

IV. Other Memberships in the *Euclid consortium* ("Theory" and "Clustering"), and in *4MOST*.

2021 List of Publications

peer-reviewed – published and submitted

ad (i) – Delgado Gaspar I., Buchert T.: 'Lagrangian theory of structure formation in relativistic cosmology. VI. Comparison with Szekeres exact solutions', *Phys. Rev. D* 103, 023513 (2021).

ad (ii) - R. Aurich, T. Buchert, M.J. France and F. Steiner: 'The variance of the CMB temperature gradient: a new signature of a multiply connected Universe', *Class. Quant. Grav.* 38, 225005 (2021).

ad (iii) - S. Appleby, C. Park, P. Pranav, S.E. Hong, H.S. Hwang, J. Kim and T. Buchert : 'Minkowski Functionals of SDSS-III BOSS: Hints of possible anisotropy in the density field?' *Astrophys. J.*, submitted (2021).

Followed 21 publications within the ERC advanced Grant (9 of which accepted or submitted.)

Chakrabarti Sandip Kumar

Position: Director, Indian Centre for Space Physics
Period covered: 2021



I Scientific Work

Along with my students and colleagues, several works in the following topics were completed

- i) In black hole astrophysics, a) Effects of jets on the spectrum of black hole candidates b) Estimation of the accretion flow parameters in galactic and extragalactic black holes from several satellite data using Two Component Advective Flow model of black hole candidates.
- ii) In ionospheric science: a) Electron precipitation during lightning and b) Correlation between the pre-seismic parameters etc.
- iii) In ICSP low-cost balloon experiments one is required to compute the background radiation for any detector environment. This is modeled for Phoswich detectors which are regularly sent by ICSP balloons. This work is done.
- iv) In Astrochemistry, identification of various lines of chemical species is done in observed data of Interstellar medium.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

The following PhD Thesis were submitted by the students supervised by me:

- 1. A. Banerjee, Spectral and Timing Properties of Class Variable Source GRS 1915+105 Using Two Component Advective Flow Solution (Calcutta University)*
- 2. P. Nandi, Spectral And Temporal Properties Of Super-Massive Black Holes In Light Of Two Component Advective Flows (Calcutta University)*
- 3. M. Sil, Physics And Chemistry Of Star Forming Region In Protoplanetary Disks (Calcutta University; Jointly with Dr. Ankan Das)*

4. *S. Ghosh Study of Tropospheric and Ionospheric Responses of Pre- and Co-Seismic Irregularities using Satellite and Ground Base Techniques (Calcutta University, jointly with Dr. S. Sasmal)*

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2021 List of Publication

1. D. Debnath, K. Chatterjee, D. Chatterjee, et al., 2021, Jet properties of XTE J1752-223 during its 2009-2010 outburst, MNRAS, 504, 4242
2. K. Chatterjee, D. Debnath, D. Chatterjee, et al., 2021, Accretion flow properties of GRS 1716-249 during its 2016-17 'failed' outburst, Ap&SS, 366, 63
3. A. Jana, G.K. Jaisawal, S. Naik, et al., 2021, Accretion properties of MAXI J1813-095 during its failed outburst in 2018, RAA, 21, 125
4. A. Jana, J.-R. Shang, D. Debnath, et al., 2021, Study of Accretion Flow Dynamics of V404 Cygni during Its 2015 Outburst, Galaxy, 9, 39
5. D. Chatterjee, A. Jana, D. Chatterjee, et al., 2021, Properties of Faint X-ray Activity of XTE J1908+094 in 2019, Galaxy, 9, 25
6. R. Bhowmick, D. Debnath, K. Chatterjee, 2021, Relation between Quiescence and Outbursting Properties of GX 339-4, ApJ, 910, 138
7. D. Chatterjee, D. Debnath, A. Jana, J. R. Shang, S.K. Chakrabarti, H. K. Chang, A. Banerjee, A. Bhattacharjee, K. Chatterjee, R. Bhowmick, S. K. Nath 2021, AstroSat observation of non-resonant type-C QPOs in MAXI J1535-571, Ap&SS, 366, 82
8. P. Nandi, A. Chatterjee, S.K. Chakrabarti, B.G. Dutta, 2021, Long-term X-ray observations of seyfert 1 galaxy ark 120: on the origin of soft-excess, 2021, MNRAS, 506, 3111

9. S. Mondal, S.K. Chakrabarti, 2021, Spectral Signature of Mass Outflow in the Two Component Advective Flow Paradigm, *ApJ*, 920, 41
10. V.U. J. Nwankwo, W. Denig, S.K. Chakrabarti, et al, 2021, Atmospheric drag effects on modelled low Earth orbit (LEO) satellites during the July 2000 Bastille Day event in contrast to an interval of geomagnetically quiet conditions, *AnGeo*, 39, 397
11. A. Roy, R. Sarkar, S.K. Chakrabarti, 2021, Background model of Phoswich X-ray detector on board small balloon, 2021, *AdSpR*, 68, 3052
12. A. Das, M. Sil, R. Ghosh, et al., 2021, Effect of binding energies on the encounter desorption, *FrASS*, 8, 78
13. P. Gorai, A. Das, T. Shimonishi, et al., 2021, Identification of Methyl Isocyanate and Other Complex Organic Molecules in a Hot Molecular Core, G31.41+0.31, *ApJ*, 907, 108
14. M. Sil, S. Srivastav, B. Bhat, S.K. Mondal, P. Gorai, R. Ghosh, T. Shimonishi, S.K. Chakrabarti, B. Sivaraman, A. Pathak, N. Nakatani, K. Furuya, Kenji; A. Das, 2021, Chemical Complexity of Phosphorous-bearing Species in Various Regions of the Interstellar Medium, 2021, *AJ*, 162, 119
15. S. Ghosh, S. Chowdhury, S. Kundu, and 6 more, Unusual Surface Latent Heat Flux Variations and Their Critical Dynamics Revealed before Strong Earthquakes, 2021, *Entropy*, 24, 23
16. S. Chowdhury, S. Sasmal, J. Brundell, S. Chakraborty, A. Bhattacharjee, S. K. Chakrabarti, 2021, Energetic electron precipitation during lightning activities over Indian landmass as observed from WWLLN and NOAA-15 satellite, *AdSpR*, 68, 4205
17. Chowdhury, S., Kundu, S., Basak, T., et al., 2021, Numerical simulation of lower ionospheric reflection parameters by using International Reference Ionosphere (IRI) model and validation with Very Low Frequency (VLF) radio signal characteristics, *AdSpR*, 67, 1599
18. Sasmal, S., Chowdhury, S., Kundu, S., et al, 2021, Pre-Seismic Irregularities during the 2020 Samos (Greece) Earthquake ($M = 6.9$) as Investigated from Multi-Parameter Approach by Ground and Space-Based Techniques, *Atmos*, 12, 1059

Cherubini Christian



Position: Associate Professor in Mathematical Physics (MAT/07).
Department of Science and Technology for Humans and the Environment
Laboratory of Nonlinear Physics and Mathematical Modeling
University “Campus Bio-Medico di Roma”,
Via A. del Portillo 21, I-00128 Rome, Italy
and
Adjunct Professor in ICRANet Faculty.

Period covered: position at ICRANet started on September 11th, 2017

I Scientific Work

- Electrodynamics and magnetohydrodynamics around black holes;
- Selfgravitating systems;
- Mathematical Biology.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Co-chairman of the parallel session on "Binary-Driven Hypernovae of type 1, 2 and 3" at the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).
- Talk with title “On Kerr black hole perfect MHD processes in Doran coordinates” in track "Strong Electromagnetic and Gravitational Field Physics: From Laboratories to Early Universe” of the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

In 2021 Prof. Cherubini has collaborated with Dr Moradi, Dr Rueda and several other ICRANet scientists on problems of electrodynamics around black holes and on self gravitating systems.

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

- Participation to the "Collegio di Dottorato" of the INTERNATIONAL RELATIVISTIC ASTROPHYSICS PH.D."

III b. Outside ICRANet

- Lecturer "Electromagnetism" (Departmental Faculty of Engineering, University Campus Bio-Medico of Rome).
- Lecturer "Mathematical Physics Models for Engineering" (Departmental Faculty of Engineering, University Campus Bio-Medico of Rome).
- Supplementary teaching for "Rational Mechanics Laboratory" (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).
- Lecturer "Mathematics" in the integrated course of Mathematics and Computer Science (Department of Science and Technology for Humans and the Environment, University Campus Bio-Medico of Rome).

IV. Other

Prof. Cherubini has a longstanding collaboration with other ICRANET scientists. In particular, in collaboration with Dr D. Bini, Prof. R. T Jantzen, Prof. R. Ruffini and Dr. J.A. Rueda, he has written several articles in various aspects of classical General Relativity. With Prof. S. Filippi he is involved in research activities in the fields of Stellar and Galactic self-gravitating Structures, Analogue models of Gravitation and Complex Systems in biophysics.

2021 List of Publications

- R. Moradi, J. A. Rueda, R. Ruffini, Liang Li, C. L. Bianco, S. Campion, C. Cherubini, S. Filippi,, Y. Wang, and S. S. Xue, "Nature of the ultrarelativistic prompt emission phase of GRB 190114C", PHYSICAL REVIEW D 104, 063043 (2021).
- A. Loppini, A. Barone, A. Gizzi, C. Cherubini, F. H. Fenton, S. Filippi, "Thermal effects on cardiac alternans onset and development: A spatiotemporal correlation analysis", PHYSICAL REVIEW E 103, L040201 (2021)
- R. Ruffini, R. Moradi, J. A. Rueda , L. Li, N. Sahakyan, Y.-C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B. Pisani, and S. S. Xue, "The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs", MNRAS 504, 5301–5326 (2021).

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Filippi Simonetta



Position: Full Professor in Theoretical Physics (FIS/02)
Departmental Faculty of Engineering
University Campus Bio-Medico of Rome,
Head, Laboratory of Nonlinear Physics and Mathematical Modeling
Via A. del Portillo 21, I-001285 Rome, Italy,
Tel. +39-06-225419611
and
Adjunct Professor in ICRANet Faculty.

Period covered: position at ICRANet started on September 12th 2017

I Scientific Work

- Electrodynamics around black holes and self-gravitating systems.
- Theoretical biophysics.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Co-chairman of the parallel session on "Binary-Driven Hypernovae of type 1, 2 and 3" at the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).
- Coauthor of the talk with title "On Kerr black hole perfect MHD processes in Doran coordinates" in track "Strong Electromagnetic and Gravitational Field Physics: From Laboratories to Early Universe" of the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).

II e. Work With Postdocs

In 2021 Prof. Filippi has collaborated with Dr Rueda, Dr Moradi and other ICRANet scientists studying the electrodynamics around black holes and some features of classical self gravitating systems.

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

Prof. Filippi serves as supervisor for IRAP PhD students.

Member of the Final Exam Commission for PhD doctoral thesis of Yen-Chen CHEN (enrolled in the 32° Sapienza cycle - XV IRAP of the Doctorate).

III b. Outside ICRANet

- Lecturer “Dynamics of Complex Systems” (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).
- Lecturer “Rational Mechanics Laboratory” (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).
- Faculty of the “Science and Engineering for Humans and the Environment PH.D “ by University Campus Bio-Medico of Rome.

- IV. Other

Prof. Filippi has a longstanding collaboration with ICRANET scientists. In particular, in collaboration with Prof. Remo Ruffini she has written several articles on various aspects of Gravitational Physics with a specific focus in classical figures of equilibrium. With Prof. Christian Cherubini, Dr Jorge Rueda, Dr Andrea Geralico and Dr Donato Bini she has been involved in research activities in the fields of Stellar and Galactic Structures, Analogue gravity models and Complex Systems in biological systems.

2021 List of Publications

- R. Moradi, J. A. Rueda, R. Ruffini, Liang Li, C. L. Bianco, S. Campion, C. Cherubini, S. Filippi,, Y. Wang, and S. S. Xue, "Nature of the ultrarelativistic prompt emission phase of GRB 190114C", PHYSICAL REVIEW D 104, 063043 (2021).
- A. Loppini, A. Barone, A. Gizzi, C. Cherubini, F. H. Fenton, S. Filippi, "Thermal effects on cardiac alternans onset and development: A spatiotemporal correlation analysis", PHYSICAL REVIEW E 103, L040201 (2021)
- R. Ruffini, R. Moradi, J. A. Rueda , L. Li, N. Sahakyan, Y.-C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B. Pisani, and S. S. Xue, "The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs", MNRAS 504, 5301–5326 (2021).

Fisher Robert

Position: **Full Professor** in Physics
Graduate Program Director
University of Massachusetts Dartmouth
285 Old Westport Road
North Dartmouth, Ma. 02740
Tel. +1-508-999-8353
Email: robert.fisher@umassd.edu



Memberships: International Astronomical Union, American Physical Society, American Astronomical Society, National Society of Black Physicists

Period covered: 2021

I Scientific Work

- **Type Ia Supernovae**
- **Star Formation**
- **Physics of the Interstellar Medium**
- **Turbulence and Combustion**
- **Computational Fluid Dynamics**

II Conferences and educational activities

II a Conferences and Other External Scientific Work

AAS 237, “Turbulence-driven deflagration-to-detonation transition in near-Chandrasekhar mass type Ia supernovae,” 1/21

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

- Research advisor to 6 graduate students and 4 undergraduate students
- Graduate program director
- Instructor for classical physics, statistical mechanics, modern physics, and astrophysics courses

IV. Other

2021 List of Publications

Y. Oshiro, H. Yamaguchi, S.-C. Leung, K. Nomoto, T. Sato, T. Tanaka, H. Okon, **R. Fisher**, R. Petre, B. Williams, “Discovery of the Highly-Neutronized Ejecta Clump with Enhanced Abundances of Titanium and Chromium in the Type Ia Supernova Remnant 3C 397,” The Astrophysical Journal Letters, 2021. [arXiv](#) [DOI](#)

S. Neopane, K. Bhargava, **R. Fisher**, M. Ferrari, S. Yoshida, S. Toonen, E. Bravo, “Near-Chandrasekhar Mass Type Ia Supernovae from the Double-Degenerate Channel,” Accepted for publication in The Astrophysical Journal, 2021. [arXiv](#)

Filippo Frontera



Position: Adjunct Professor of ICRANET, Distinguished Scholar of the University of Ferrara, Associated Senior Scientist of INAF-OAS Bologna

Period covered: January - December 2021

I Scientific Work

Experimental and observational X-/gamma-ray astronomy, in particular:

- a. Prosecution of the development of a focusing Laue lens of gamma-rays for space astrophysics;
- b. Contribution to the mission concept, THESEUS, for an ESA study phase A, devoted to high z GRBs, multi-messenger astronomy and monitoring of the X-ray sky for the search of new transient phenomena.
- c. Prosecution of the study of a space mission concept ASTENA (Advanced Surveyor of Transient Events and Nuclear Astrophysics) based on two instruments: a Narrow Field Telescope with a 50-700 keV pass band, unprecedented sensitivity and <1 arcmin angular resolution and a Wide Field Monitor-Imaging Spectrometer (WFM-IS) with a very large wide field (2 sr), a broad band (1 keV-10 MeV), with imaging, spectroscopy and polarimetric capabilities.
- d. Publication of two white papers, based on the ASTENA mission performance, previously submitted to ESA for the new ESA programme “Voyage 2015”, and later the subject of two publications in Experimental Astronomy (see paper list): one on “A Deep Study of the High-Energy Transient Sky” by Guidorzi et al. (2021), the other on "Understanding the Origin of Positron Annihilation Line and the Physics of the Supernova Explosions” by Frontera et al.(2021).
- e. Contribution to the scientific exploitation of the Chinese satellite mission Insight-HXMT, in particular on the search of the high energy counterparts of Fast Radio Bursts.

II Conferences and educational activities

II a. Conferences and Other External Scientific Work

Due to pandemic most of the programmed conferences have been cancelled. Few of them were held on line. A contribution was given to the following ones:

- 1. THESEUS Conference, held on March 23-26, 2021*
- 2. High Precision X-ray Measurements 2021 conference held in June 8-10, 2021;*
- 3. 16th Marcel Grossmann Meeting, July 5-9, 2021.*

II b. Work With Students

yes, with

- a) 1 Master student in Physics of University of Ferrara: Leo Cavazzini*

II c. Other Teaching Duties

Course for the Master's Degree in Physics, University of Ferrara, on "Measures and Observations of Celestial X- and gamma-rays".

II d. Work With Postdocs

Yes, with 1 PostDoc: Miguel Moita, at the Physics and Earth Sciences Department, University of Ferrara

III. Service activities

III a. Member of the IRAP-PhD Faculty

IV. Other

none

2021 List of Publications

- 1. Farinelli, Ruben; Basak, Rupal; Amati, Lorenzo; Guidorzi, Cristiano; Frontera, Filippo, A numerical jet model for the prompt emission of gamma-ray bursts, Monthly Notices of the Royal Astronomical Society, Volume 501, Issue 4, pp.5723-5732 (2021).*
- 2. Maiolino, T.; Titarchuk, L.; Wang, W.; Frontera, F.; Orlandini, M., Comptonization as an origin of the continuum in Intermediate Polars, The Astrophysical Journal, Volume 911, Issue 2, id.80, 14 pp (2021).*
- 3. Guidorzi, C.; Frontera, F. ; Ghirlanda, G. ; Stratta, G. ; Mundell, C. G. ; Virgili, E. ; Rosati, P. ; Caroli, E. ; Amati, L. ; Pian, E. ; Kobayashi, S. ; Ghisellini, G. ; Fryer, C. ; Della Valle, M.;*

- Margutti, R. ; Marongiu, M. ; Martone, R. ; Campana, R. ; Fuschino, F. ; Labanti, C. ; ..., *A deep study of the high-energy transient sky*, Experimental Astronomy, Volume 51, Issue 3, p.1203-1223 (2021)
4. Verscharen, Daniel ; Wicks, Robert T. ; Branduardi-Raymont, Graziella ; Erdélyi, Robertus ; Frontera, Filippo ; Götz, Charlotte ; Guidorzi, Cristiano ; Leboutellier, Vianney ; Matthews, Sarah A. ; Nicastro, Fabrizio ; Rae, Iain Jonathan ; Retinò, Alessandro ; Simionescu, Aurora ; Soffitta, Paolo ; Uttley, Phil ; Wimmer-Schweingruber, Robert F. , *The Plasma Universe: A Coherent Science Theme for Voyage 2050*, Frontiers in Astronomy and Space Sciences, Volume 8, id.30 (2021).
 5. Amati, L. ; O'Brien, P. T. ; Götz, D. ; Bozzo, E. ; Santangelo, A. ; Tanvir, N.; Frontera, F. ; Mereghetti, S. ; Osborne, J. P. ; Blain, A. ; Basa, S. ; Branchesi, M. ; Burderi, L. ; Caballero-García, M. search by orcid ; Castro-Tirado, A. J. ; Christensen, L. ; Ciolfi, R. ; De Rosa, A. search by orcid ; Doroshenko, V. ; Ferrara, A. ; ... , *The THESEUS space mission: science goals, requirements and mission concept*, Experimental Astronomy, Online First (November 2021), eprint arXiv:2104.09531.
 6. Tanvir, N. R. ; Le Floc'h, E. ; Christensen, L. ; Caruana, J. ; Salvaterra, R. ; Ghirlanda, G. ; Ciardi, B. ; Maio, U. ; D'Odorico, V. ; Piedipalumbo, E. ; Campana, S. ; Noterdaeme, P. ; Graziani, L. search by orcid ; Amati, L. ; Bagoly, Z. ; Balázs, L. G. ; Basa, S. ; Behar, E. ; Bozzo, E. ; De Cia, A. ; ..., Frontera, F., ..., *Exploration of the high-redshift universe enabled by THESEUS*, Experimental Astronomy, Online first (July 2021), eprint arXiv:2104.09532.
 7. Mereghetti, S. ; Balman, S. ; Caballero-Garcia, M.; Del Santo, M. ; Doroshenko, V. ; Erkut, M. H. ; Hanlon, L. ; Hoefflich, P. ; Markowitz, A. ; Osborne, J. P. ; Pian, E. ; Rivera Sandoval, L. ; Webb, N. ; Amati, L. ; Ambrosi, E. ; Beardmore, A. P. ; Blain, A. ; Bozzo, E. ; Burderi, L. ; Campana, S. ; .., Frontera, F., ..., *Time Domain Astronomy with the THESEUS Satellite*, Experimental Astronomy, Online first (November 2021), eprint arXiv:2104.09533 (April 2021).
 8. Rosati, P. ; Basa, S. ; Blain, A. W. ; Bozzo, E. ; Branchesi, M. ; Christensen, L. ; Ferrara, A. ; Gomboc, A. ; O'Brien, P. T. ; Osborne, J. P. ; Rossi, A. search by orcid ; Schüssler, F. ; Spurio, M. ; Stergioulas, N. ; Stratta, G. ; Amati, L. ; Casewell, S. ; Ciolfi, R. ; Ghirlanda, G. ; Grimm, S. ; ..., Frontera, F., ..., *Synergies of THESEUS with the large facilities of the 2030s and guest observer opportunities*, Experimental Astronomy, Online first (July 2021), eprint arXiv:2104.09535 (April 2021).
 9. F. Frontera, E. Virgili, C. Guidorzi, P. Rosati, R. Diehl, T. Siegert, C. Fryer, L. Amati, N. Auricchio, R. Campana, E. Caroli, F. Fuschino, C. Labanti, M. Orlandini, E. Pian, J. B. Stephen, S. Del Sordo, C. Budtz-Jorgensen, I. Kuvvetli, S. Brandt, R. M. Curado da Silva, P. Laurent, E. Bozzo, P. Mazzali & M. Della Valle, *Understanding the origin of the positron annihilation line and the physics of supernova explosions*, Experimental Astronomy, Volume 51, Issue 3, p.1175-1202 (2021).

10. Moita, M.; Curado da Silva, R. M.; Maia, J. M.; Caroli, E.; Virgilli, E.; Auricchio, N.; Stephen, J. B.; Frontera, F.; del Sordo, S., *Polarimetry With a Multilayer CdTe Prototype for Soft Gamma-Ray Astrophysics*, IEEE Transactions on Nuclear Science, vol. 68, issue 11, pp. 2655-2660 (2021).
11. M. Moita, L. Ferro, E. Caroli, E. Virgilli, R. Curado da Silva, S. del Sordo, J. Maia, J. Stephen, F. Frontera, *ASTENA's Polarimetric Prospects*, IEEE Transactions on Nuclear Science, in the press (2021).
12. Filippo Mele; Irisa Dedolli; Massimo Gandola; Marco Grassi; Piero Malcovati; Lorenzo Amati; Pierluigi Bellutti; Giacomo Borghi; Riccardo Campana; L Evgeny Demenev; Francesco Ficorella; Mauro Fiorini; Filippo Frontera; Fabio Fuschino; Claudio LabantK; Ezequiel Marchesini; Antonino Picciotto; Alexandre Rachevski; Irina Rashevskaya; Enrico Virgilli; Gianluigi Zampa; Nicola Zampa; Nicola Zorzi; Andrea Vacchi; Giuseppe Bertuccio, *ORION, a Multichip Readout Electronics for Satellite Wide Energy Range X-/γ-Ray Imaging Spectroscopy: Design and Characterization of the Analog Section*, IEEE Transactions on Nuclear Science, Volume: 68, Issue 12, Page(s): 2801 - 2809 (2021).
13. Hudec, R. ; Simon, V. ; Amati, L. ; Frontera, F. ; Bozzo, E. ; O'Brien, P. ; Goetz, D., *ESA THESEUS and cataclysmic variables*, in: The Golden Age of Cataclysmic Variables and Related Objects V. 2-7 September 2019. Palermo, Italy. published February 25, 2021. Online at <https://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=368,id.56> (2021).
14. Laurent, P.; Acero, F.; Beckmann, V.; Brandt, S.; Cangemi, F.; Civitani, M.; Clavel, M.; Coleiro, A.; Curado, R.; Ferrando, P.; Ferrigno, C.; Frontera, F.; Gastaldello, F.; Gtz, D.; Gouis, C.; Grinberg, V.; Hanlon, L.; Hartmann, D.; Maggi, P.; Marin, F.; Meuris, A.; Okajima, T.; Pareschi, G.; Pratt, G. W.; Rea, N.; Rodriguez, J.; Rossetti, M.; Spiga, D.; Virgilli, E.; Zane, S., *PHEMTO : Polarimetric High Energy Modular Telescope Observatory*, Experimental Astronomy, Volume 51, Issue 3, p.1143-1173 (2021).

Chris Fryer

Position: Scientific Committee
Period covered: 2021



I Scientific Work:

Astrophysical Transients (core-collapse supernovae, gamma-ray bursts): engines, nucleosynthesis, remnants, multi-messenger emission

II Conferences and educational activities

II a Conferences and Other External Scientific Work

SOC: MG16, INT Workshop “Radionuclides: Nuclear Physics, Astrophysical Models, and Observations”, ECT* workshop “Probing Nuclear Physics with Neutron Star Mergers”, APS April meeting (division of astrophysics sessions)

II b Work With Students: Mohira Rassel, Sophie Abrahams, Maya Wallach, Alex Kaltenborn, Brooke Polak, Alexander Hall-Smith, Platon Karpov, Marko Ristic, Sam Slocam, Thomas Lechner, Aidan Nakbleh, Jack Rudrum, Ezra Brooker, Sarah Stangl

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs: Rachel Smullen, Soumi De

III. Service activities [activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]

III a. Within ICRANet

III b. Outside ICRANet: APS DAP executive board, Chandra Users Community Board, Review Board, Center for Non-Linear Studies (LANL), Astro lead for the Center for Space and Earth Sciences (LANL), board of the Information of Science and Technology Institute (LANL)

IV. Other

2021 List of Publication

2021 R. T. Wollaeger, C. L. Fryer, E. A. Chase, C. J. Fontes, M. Ristic, A. L. Hungerford, O. Korobkin,

R. O’Shaughnessy, and A. M. Herring. A Broad Grid of 2D Kilonova Emission Models. *ApJ*, volume 918, page 10, September 2021.

2021 A. L. Thakur, S. Dichiara, E. Troja, E. A. Chase, R. Sánchez-Ramírez, L. Piro, C. L. Fryer, N. R. Butler, A. M. Watson, R. T. Wollaeger, E. Ambrosi, J. Becerra González, R. L. Becerra, G. Bruni, S. B. Cenko, G. Cusumano, A. D’Ai, J. Durbak, C. J. Fontes, P. Gatkine, A. L. Hungerford, O. Korobkin, A. S. Kutyrev, W. H. Lee, S. Lotti, G. Minervini, G. Novara, V. La Parola, M. Pereyra, R. Ricci, A. Tiengo, and S. Veilleux. Erratum: A search for optical and near-infrared counterparts of the compact binary merger GW190814. *MNRAS*, volume 501, pages 2821–2821, February 2021.

2021 B. O’Connor, E. Troja, S. Dichiara, E. A. Chase, G. Ryan, S. B. Cenko, C. L. Fryer, R. Ricci, F. Marshall, C. Kouveliotou, R. T. Wollaeger, C. J. Fontes, O. Korobkin, P. Gatkine, A. Kutyrev, S. Veilleux, N. Kawai, and T. Sakamoto. A tale of two mergers: constraints on kilonova detection in two short GRBs at $z \sim 0.5$. *MNRAS*, volume 502, pages 1279–1298, March 2021.

2021 Oleg Korobkin, Ryan T. Wollaeger, Christopher L. Fryer, Aimee L. Hungerford, Stephan Rosswog, Christopher J. Fontes, Matthew R. Mumpower, Eve A. Chase, Wesley P. Even, Jonah Miller, G. Wendell Misch, and Jonas Lippuner. Axisymmetric Radiative Transfer Models of Kilonovae. *ApJ*, volume 910, page 116, April 2021.

2021 Platon Karpov, Iskandar Sitdikov, Chengkun Huang, and Chris Fryer. Sapsan: Framework for Supernovae Turbulence Modeling with Machine Learning. *The Journal of Open Source Software*, volume 6, page 3199, November 2021.

2021 H. M. Johns, C. L. Fryer, S. R. Wood, C. J. Fontes, P. M. Kozlowski, N. E. Lanier, A. Liao, T. S. Perry, J. W. Morton, C. R. D. Brown, D. W. Schmidt, T. Cardenas, T. J. Urbatsch, P. Hakel, J. Colgan, S. Coffing, J. Cowan, D. Capelli, L. A. Goodwin, T. E. Quintana, C. Hamilton, F. Fierro, C. Wilson, R. B. Randolph, P. Donovan, T. Sedillo, R. Gonzales, M. E. Sherrill, M. R. Douglas, W. J. Garbett, J. D. Hager, and J. Kline. A temperature profile diagnostic for radiation waves on OMEGA-60. *High Energy Density Physics*, volume 39, page 100939, June 2021.

2021 C. Guidorzi, F. Frontera, G. Ghirlanda, G. Stratta, C. G. Mundell, E. Virgili, P. Rosati, E. Caroli, L. Amati, E. Pian, S. Kobayashi, G. Ghisellini, C. Fryer, M. Della Valle, R. Margutti, M. Marongiu, R. Martone, R. Campana, F. Fuschino, C. Labanti, M. Orlandini, J. B. Stephen, S. Brandt, R. Curado da Silva, P. Laurent, R. Mochkovitch, E. Bozzo, R. Cioffi, L. Burderi, and T. Di Salvo. A deep study of the high-energy transient sky. *Experimental Astronomy*, April 2021.

2021 C. L. Fryer, P. Karpov, and D. Livescu. Understanding Convection in the Core-Collapse Supernovae Engine. *Astronomy Reports*, volume 65, pages 937–941, October 2021.

2021 F. Frontera, E. Virgili, C. Guidorzi, P. Rosati, R. Diehl, T. Siebert, C. Fryer, L. Amati, N. Auricchio, R. Campana, E. Caroli, F. Fuschino, C. Labanti, M. Orlandini, E. Pian, J. B. Stephen, S. Del Sordo, C. Budtz-Jorgensen, I. Kuvvetli, S. Brandt, R. M. Curado da Silva, P. Laurent, E. Bozzo, P. Mazzali, and M. Della Valle. Understanding the origin of the positron annihilation line and the physics of supernova explosions. *Experimental Astronomy*, June 2021.

2021 W. Fong, T. Laskar, J. Rastinejad, A. Rouco Escorial, G. Schroeder, J. Barnes, C. D. Kilpatrick,

K. Paterson, E. Berger, B. D. Metzger, Y. Dong, A. E. Nugent, R. Strausbaugh, P. K. Blanchard, A. Goyal, A. Cucchiara, G. Terreran, K. D. Alexander, T. Eftekhari, C. Fryer, B. Margalit, R. Margutti, and M. Nicholl. The Broadband Counterpart of the Short GRB 200522A at $z = 0.5536$: A Luminous Kilonova or a Collimated Outflow with a Reverse Shock? *ApJ*, volume 906, page 127, January 2021.

2021 Margot Fitz Axen, Julia Speicher, Aimee Hungerford, and Chris L. Fryer. Cosmic ray transport in mixed magnetic fields and their role on the observed anisotropies. *MNRAS*, volume 500, pages 3497–3510, January 2021.

2021 Margot Fitz Axen, Stella S. S. Offner, Brandt A. L. Gaches, Chris L. Fryer, Aimee Hungerford, and Kedron Silsbee. Transport of Protostellar Cosmic Rays in Turbulent Dense Cores. *ApJ*, volume 915, page 43, July 2021.

Lee Hyung Won

Position: Professor

Period covered: Jan. 1st ~ Dec. 31st, 2021



I Scientific Work

Parameter Estimation Pipeline development for LIGO/KAGRA collaborations

Machine Learning Application for cosmology

More accurate gravitational waveform development

Developing an efficient parameter estimation software

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

Organization of 21st Italian-Korean Symposium for Relativistic Astrophysics, Aug. 2 ~ Aug. 6 2021, Seoul, Korea

III b. Outside ICRANet

Lectures for Inje University

Various lectures for gravitational wave data analysis

IV. Other

1. Hyung Won Lee, “A brief history of the Italian–Korean symposium on relativistic astrophysics”, J. Kor. Phys. Soc., **78**, 972(2021), <https://doi.org/10.1007/s40042-021-00120-3>
2. 17 LSC Collaboration papers

Marco Merafina

- Born in Rome (Italy) on May 29, 1959
- Graduated in Physics at University of Rome "La Sapienza" on January 30, 1986
- Researcher at Physics Department - University of Rome "La Sapienza" since 1992
- Member of the Executive Committee of Physics Department 1995-1999
- Member of Academic Board of University of Rome "La Sapienza" for *macroarea 1* (Mathematics, Physics, Chemistry, Geology and Information Science) 2006-2009
- Member of Administration Board of University of Rome "La Sapienza" 2002-2006, 2009-2013
- Member of Board of Faculty of Phd in Astronomia e Astrofisica (Università La Sapienza) 2006-
- Member of Board of Faculty of the International Phd in Astronomy, Astrophysics and Space Science; PhD supervisor and tutoring 2011-
- Member of Direction Board of AURIS (Associazione Università, Ricerca, Innovazione e Società - www.aurisonlus.it) 2007-
- Frascati National Laboratories -INFN- associate 2015-

Scientific activity

- Author of more than 50 international publications
- Referee for the journals: ApJ, MNRAS, A&A, ApSS
- Member of Board of Referees of the journal "Scienze e Ricerche" 2015-

Research Topics

I. Equilibrium and dynamical stability of selfgravitating systems

Study of compact objects like relativistic stellar clusters, as possible progenitors of supermassive black holes observed at the inner regions of active galactic nuclei. Study of the equilibrium configurations and analysis of dynamical and thermodynamical stability for models of stellar clusters with anisotropy in velocity distribution of stars.

II. Galactic halos, dark matter and dark energy

Study of semidegenerate particles systems (Fermions) in gravitational equilibrium as a possible description for galactic halos, considerable in cosmological problem of dark matter. Generalization to semidegenerate distributions with cutoff energy in phase space in presence of visible mass. Study of selfgravitating equilibrium configurations in presence of anisotropy in velocity distribution of particles. Models of spheroidal dwarf galaxies with exotic composition of dark matter halos by macro strange matter conglomerates. Research development on the effects of the presence of dark energy on large scale selfgravitating structures and study of the formation of substructures in the center of galaxy clusters.

III. Thermodynamic treatment of astrophysical systems

Study of thermodynamical instabilities connected to the evolution of selfgravitating systems strongly influenced by relaxation processes like globular clusters. Development of models describing the evolution of globular clusters to the onset of gravothermal catastrophe, starting from a new statistical approach which defines a different formalism of the various thermodynamical ensembles, out of the framework of the Boltzmannian theory, by using techniques based on effective potentials applied to distribution function. Generalization to multimass models. N-body simulations.

Brian Punsly

Position: Research Scientist
Period covered: 10/2020 – 10/2021



I Scientific Work

Black Holes and Quasars

1. Introduction

This report describes the research performed by Brian Punsly and collaborators in cooperation with ICRANet in 2021. The research was directed at finding environmental factors that are related to the switch-on of the general relativistic engine responsible for the few percent of accreting black holes that drive powerful relativistic jets.

2. Observing the Time Evolution of the Multicomponent Nucleus of 3C 84

Abstract:

The advent of global millimeter-band very long baseline interferometry (VLBI) in recent years has finally revealed the morphology of the base of the two most prominent nearby, bright, extragalactic radio jets in M87 and 3C 84. The images are quite surprising considering the predictions of jet theory and current numerical modeling. The jet bases are extremely wide compared to expectations, and the nucleus of 3C 84 is very complicated. It appears as a double nucleus in 86 GHz observations with 50 μ as resolution and a triple nucleus with 30 μ as resolution with space-based VLBI by RadioAstron at 22 GHz. What is even odder is that the double and triple nuclei are arranged along an east–west line that is approximately orthogonal to the north–south large-scale jet on 150 μ as–4 mas scales. We explore the emergence of an (east–west) double nucleus in the lower-resolution 43 GHz Very Long Baseline Array (VLBA) imaging from 2018 August to 2020 April. The double nucleus is marginally resolved. We exploit the east–west resolution associated with the longest baselines, ~ 0.08 mas, to track a predominantly east–west separation speed of $0.086 \pm 0.008c$. We estimate that the observed mildly relativistic speed persists over a de-projected distance of ~ 1900 – 9800 times the central, supermassive black hole gravitational radius (~ 0.3 – 1.5 ltyr) from the point of origin.

3. The Bulk Flow Velocity and Acceleration of the Inner Jet in M87

ABSTRACT:

A high sensitivity, 7 mm Very Long Baseline Array image of M87 is analyzed in order to estimate the jet velocity within 0.65 mas of the point of origin. The image captured a high signal-to-noise, double-ridged, counter-jet extending ~ 1 mas from the nucleus. After defining conditions and requirements that justify approximate time averaged bilateral symmetry, a continuous set of Lorentz transformations are found that map the double-ridged counter-jet intensity profile into the double-

ridged jet intensity profile. The mapping is realized by a uniformly accelerating flow with intrinsic velocity of $\sim 0.27c$ at 0.4 mas (a de-projected distance of 0.38 lt-yr) to $0.38c$ at 0.65 mas (a de-projected distance of 0.61 lt-yr) from the nucleus. Since the velocity field is derived from the global surface brightness profile and does not depend on the motion of enhanced features, it is most likely a bulk flow velocity as opposed to a pattern velocity. This interpretation is corroborated by the fact that the distribution of the apparent velocities of previously identified individual features (from the literature) within 0.65 mas of the nucleus are consistent with local hydrodynamic shocks being advected with the local bulk flow velocity. The bulk flow velocity of the visible inner jet is a constraint that can potentially break degeneracies between numerical simulations that are designed to replicate both the annulus that was imaged by the Event Horizon Telescope as well as the base of the inner jet.

4. Did the Event Horizon Telescope Detect the Base of the Sub-milliarcsecond Tubular Jet in M87?

ABSTRACT:

A high-sensitivity, 7 mm Very Long Baseline Array image of M87 was previously analyzed in order to estimate the bulk flow jet velocity between 0.4 and 0.65 mas from the point of origin using the asymmetry between the well characterized double-ridged counter-jet (unique to this image) and the double-ridged jet. We use this same image to estimate the cross-sectional area of this tubular stream. The velocity, acceleration, cross-sectional area, and flux density along this stream determine a unique, perfect magnetohydrodynamic jet solution that satisfies conservation of energy, angular momentum, and mass (a monotonic conversion of Poynting flux to kinetic energy flux along the jet). The solution is protonic and magnetically dominated. The bilateral jet transports $\approx 1.2 \times 10^{-4}$ solar masses per year and $\approx 1.1 \times 10^{42}$ erg/sec, placing strong constraints on the central engine. A Keplerian disk source that also produces the Event Horizon Telescope (EHT) annulus of emission can supply the energy and mass if the vertical magnetic field at the equator is $\sim 1\text{--}3.5$ G (depending on location). A Parker spiral magnetic field, characteristic of a wind or jet, is consistent with the observed EHT polarization pattern. Even though there is no image of the jet connecting with the annulus, it is argued that these circumstances are not coincidental and the polarized portion of the EHT emission is mainly jet emission in the top layers of the disk that is diluted by emission from an underlying turbulent disk. This is a contributing factor to the relatively low polarization levels that were detected.

II Conferences and educational activities

N/A

III. Service activities *N/A*

IV. Other

2021 List of Publication

Punsly, Brian; Nagai, Hiroshi; Savolainen, Tuomas; Orienti, Monica, “Observing the Time Evolution of the Multicomponent Nucleus of 3C 84”, 2021 ApJ 911 19

Punsly, Brian “The Bulk Flow Velocity and Acceleration of the Inner Jet in M87”, 2021 ApJ 918 4

Punsly, Brian and Sina Chen “Did the Event Horizon Telescope Detect the Base of the Sub-milliarcsecond Tubular Jet in M87?”, 2021 ApJ 921L 38

Quevedo Hernando



Position: Full Professor - National Autonomous University of Mexico -

Period covered: 2021

I Scientific Work

Topics:

- Exterior and interior solutions of Einstein's equations and applications in relativistic astrophysics.
- The physics of naked singularities.
- Geometrothermodynamics of black holes.
- Applications of geometrothermodynamics in cosmology.
- Topological quantization of classical field theories.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- 16 Marcel Grossmann Meeting, Virtual Meeting, July 5-10, 2021.

II b Work With Students

II c Diploma thesis supervision

- Pedro Sánchez (PhD)
Topic: Geometrothermodynamics in relativistic astrophysics
- Servando Vargas (PhD)
Topic: Singularity theorems in general relativity
- Luis Miguel Sánchez (PhD)
Topic: Thermodynamics of Friedman-Lemaitre-Robertson-Walker universes
- Fernando Aragón (PhD)
Topic: Symplectic structure of geometrothermodynamics

II d Other Teaching Duties

II e. Work With Postdocs

- Francisco L. Escamilla, UNAM
- Saken Toktarbay, Kazakh National University

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

III b. Outside ICRANet

Course: Relativistic Cosmology - UNAM

IV. Other

2021 List of Publications

“Kerr metric bundles: Killing horizons confinement, light-surfaces and horizon replicas” (Daniela Pugliese and Hernando Quevedo) *European Physical Journal C*, **81**(3), 258 (2021).

“Reparametrizations and metric structures in thermodynamic phase space” (Pineda-Reyes, V; Escamilla-Herrera, LF; Gruber, C; Nettel, F; Quevedo, H.) *Physica A: Statistical Mechanics and its Applications* **563**,125464 (2021).

“Quantum signatures from Horava–Lifshitz cosmography” (Escamilla-Rivera, C; Quevedo, H.) *Classical and Quantum Gravity* **38**, 115009 (2021).

“Repulsive gravity effects in horizon formation Horizon remnants in naked singularities” (Quevedo, H.) *General Relativity and Gravitation* **53**(10), 89 (2021).

“Luminosity of accretion disks in compact objects with a quadrupole” (Boshkayev, K; Konysbayev, T; Kurmanov, E; Luongo, O; Malafarina, D; Quevedo, H.) *Physical Review D*, **104**(8), 084009 (2021).

“Extracting information on black hole horizons” (Pugliese, D; Quevedo, H.) *Nuclear Physics B* **972**, 115544 (2021).

“Approximate perfect fluid solutions with quadrupole moment” (Abishev, M; Beissen, N; Belissarova, F; Boshkayev, K; Mansurova, A; Muratkhan, A; Quevedo, H; Toktarbay, S.) *International Journal of Modern Physics D*, **30**(13), 2150096 (2021).

“Black shells and naked shells” (Walter Pulido and Hernando Quevedo) *International Journal of Geometric Methods in Modern Physics* **18** (13), 2150200 (2021).

“Accretion disk luminosity for black holes surrounded by dark matter with anisotropic pressure” (Kuantay Boshkayev, Roberto Giambò, Talgar Konysbayev, Ergali Kurmanov, Orlando Luongo, Daniele Malafarina, Hernando Quevedo), accepted in *Astrophysical Journal* (2021).

“Thermodynamic length, geometric efficiency and Legendre invariance” (Carlo Cafaro, Orlando Luongo, Stefano Mancini, Hernando Quevedo) accepted in *Physica A* (2021).

“Darmois matching and C3 matching” (Antonio Calixto Gutiérrez-Piñeres, Hernando Quevedo) accepted in *Classical and Quantum Gravity* (2021).

Soroush Shakeri



Current position: Assistant Professor at Isfahan University of Technology (IUT)
The Head of ICRANet-Isfahan
Adjunct Professor ICRANet, Italy

Date of Birth : 14/07/1988

Place of Birth : Ahvaz, Iran

Address : Department of Physics,
Isfahan University of Technology, Isfahan 84156-83111, Iran

Telephone : +98 09387106317

E-mail : s.shakeri@iut.ac.ir

Place of Birth. : Ahvaz, Iran

Homepage. : <https://shakeri.iut.ac.ir>

•Scientific Area

- *Astroparticle Physics*
- *High Energy Astrophysical Phenomena*
- *Gamma Ray Bursts (GRBs)*
- *Dark Matter - Direct and Indirect Detections*
- *Strong Field QED Phenomena*
- *Early Universe Cosmology*

• List of Publication - 2021

Davood Rafiei Karkevandi, Soroush Shakeri, Violetta Sagun, Oleksii Ivanytskyi, **Bosonic Dark Matter in Neutron Stars and its Effect on Gravitational Wave Signal**, **Phys. Rev. D** **105**, 023001 (2022), [[arXiv:2109.03801v2](https://arxiv.org/abs/2109.03801v2)]

Davood Rafiei Karkevandi, Soroush Shakeri, Violetta Sagun, Oleksii Ivanytskyi, **Tidal Deformability as a Probe of Dark Matter in Neutron Stars**,
Contribution to: [MG16](#), [[arXiv:2112.14231](https://arxiv.org/abs/2112.14231)]

Aidin Momtaz, Mohammad Hossein Salimi, Soroush Shakeri, **Estimating the Photometric Redshifts of Galaxies and QSOs Using Regression Techniques in Machine Learning**,
Contribution to: [MG16](#), [[arXiv:2201.04391](https://arxiv.org/abs/2201.04391)]

Shedding New Light on Sterile Neutrinos from XENON1T Experiment, Soroush Shakeri, Fazlollah Hajkarim, She-Sheng Xue, **JHEP12(2020)194**, [[arXiv:2008.05029](https://arxiv.org/abs/2008.05029)]

- *Service Activities Within ICRANet*

- *Organizing ICRANet-Isfahan Astronomy virtual Meeting 3 - 5 November 2021*

Chair of Organizing Committee - Member of Scientific Committee

In collaboration with ICRANet-Italy, In ICRANet-Isfahan, We have organized the First Series of online ICRANet-Isfahan Astronomy Meeting from November 3 to November 5, 2021. ICRANet-Isfahan virtually hosted more than 33 prominent invited speakers from more than 16 countries. There were more than 190 registered participants and attendees. This meeting was inaugurated with the honorary support and a message from the Minister of Science, Research and Technology of the Islamic Republic of Iran, H.E. Mohammad Ali Zolfi Gol. This meeting provided a great opportunity for discussing about topics ranging from the ancient Persian astronomy to recent developments in observational astronomy, high energy astrophysical phenomena such as Gamma-Ray Bursts (GRBs) and Active Galactic Nuclei (AGNs), Theories of Gravity, General Relativity and its Mathematical Foundation, Black Holes, Dark matter and Early Universe Cosmology. There was also a workshop on "Data Science and Machine Learning in Relative Astrophysics"

Website : <https://indico.icranet.org/event/2/>

Youtube : <https://www.youtube.com/watch?v=6nM0WwpawdM&t=790s>

E-NewsLetter : <https://english.iut.ac.ir/node/600>

- *Organizing a parallel session in 16th Marcel Grossmann virtual Meeting (MG16) 5-10 July 2021*

Chair of a Parallel session (DM4)

In collaboration with Prof. She-Sheng Xue, I have organized a parallel session in MG16 titled "Dark Matter Searches with Liquid Xenon and Argon Detectors". In this session which was held on Wednesday 7th July, by inviting several scientists including some from XENON1T experiment, we discussed possible signatures of different sub-Gev dark matter candidates within current and future LXe/LAr detectors. We had presentations of recent results, ongoing efforts and theoretical attempts in the next generation of XENON detectors such as XENONnT, LZ, PandaX-II and Darwin. We talked about the XENON1T new observation on low-energy excess in electronic recoils and possible requirement for further confirmation with more precise future instruments. Both contributions on experimental and theoretical efforts were presented.

Website : <https://indico.icranet.org/event/1/sessions/8/#20210707>

Youtube : <https://www.youtube.com/watch?v=H9oGYnGq9pI&t=161s>

- *Organizing a virtual meeting on the occasion of World Astronomy Week, May 11-12, 2021*

Chair of Organizing Committee

International Astronomy Week is an annual event intends to inform students and general audience about Astronomy and Astrophysics, and to provide an active atmosphere for professionals, scholars and students to interact and exchange new ideas of the fields. We have organized this event in ICRANet-Isfahan. Due to the pandemic issue, the meeting was held via remote virtual meeting stuff and this gave us the opportunity to get together virtually from Italy and Iran to have a fruitful meeting.

- *Within ICRANet - Oral Talks*

Soroush Shakeri, She-Sheng Xue **17th Italian-Korean Symposium for Relativistic Astrophysics**, 5th August 2021, The Role of Sterile Neutrinos in Cosmology and recent anomalies in Dark Matter Searches.

Link : <http://45.120.69.181/plan.php/kis2021/3445>

<https://drive.google.com/file/d/1p7XiH9evqCoB1Z2MSP63x6V1F-Onjgkt/view>

Soroush Shakeri, She-Sheng Xue, **Sixteenth Marcel Grossmann Meeting (MG16)**, 7th July 2021, Hunt for the Sterile Neutrino Dark Matter.

Link : <https://indico.icranet.org/event/1/contributions/993/attachments/244/367/Finalpresentation.pdf>

•*Outside ICRANet - Oral Talks*

Soroush Shakeri, IRCHEP 1400, Iranian Conference on High Energy Physics
Deciphering the Universe Ciphers, School of Physics, **The Role of Sterile Neutrinos
in Recent Observed Anomalies**, IPM 8-10 November, 2021

Link : <http://physics.ipm.ac.ir/conferences/irchep/note/S.Shakeri.pdf>

Soroush Shakeri, **Direct and Indirect Probes for Dark Matter**: from Recoil Electrons
to Gravitational Waves, Weekly Meeting, IPM, 17 November
[/https://indico.particles.ipm.ir/indico/event/445](https://indico.particles.ipm.ir/indico/event/445)

Neutron Stars as dark matter probes, V. Sagun, O. Ivanytskyi, I. Lopez, D. R.

Karkevandi, S. Shakeri, Sep 27 – 30, 2021 Yerevan, Armenia

[https://indico.cern.ch/event/1046655/contributions/4535145/attachments/2321226/3952727/
Sagun2021.pdf](https://indico.cern.ch/event/1046655/contributions/4535145/attachments/2321226/3952727/Sagun2021.pdf)

[/https://indico.cern.ch/event/1046655/contributions/4535145](https://indico.cern.ch/event/1046655/contributions/4535145)

•*Outside ICRANet - Teaching Activities*

Analytic Mechanics I, II. Astrophysics, Particle Physics, Isfahan University of Technology

•*Outside ICRANet -Research experience*

Reviewer of Iranian Journal of Research on Many Body Systems.

Reviewer of Articles in Iranian National conference of Gravity and Cosmology 1400.

Reviewer of Proposals in Khwarizmi Youth Award.

Reviewer of Articles in Iranian Conference on Mathematical Physics Conference.

•*Scientific Proposals Within ICRANet*

• Detectability of GRB Optical Prompt and Afterglow with Iranian National
Observatory (INO340) - ICRANet-Italy & ICRANet-Isfahan

• Probing Dark Matter with Neutron Stars - ICRANet-Italy & ICRANet-Isfahan

•*Work in Progress*

Bosonic Dark Matter in light of the NICER Precise Radius Measurements,
Soroush Shakeri, Davood Rafiei Karkevandi, et al. 2022

Probing Axions via Light Circular Polarization and Event Horizon Telescope,
Soroush Shakeri and Fazlollah Hajkarim, 2022

Relic Density of Sterile Neutrinos, Somayyeh Mahmoudi, Soroush Shakeri and She-
Sheng Xue, 2022

Search for Sterile Neutrinos at MiniBooNE Experiment, Soroush Shakeri, Sina
Etebar, She-Sheng Xue, Fazlollah Hajkarim, 2022

•*Diploma thesis supervision*

Sina Etebar, **The Role of Sterile Neutrinos to Explain Various Anomalies Observed in Neutrino
Oscillation**

Experiments, 2021

Hanieh Karimi, **Dark Matter Effects in Neutron Star Properties**, 2021

List of Publications Within ICRANet before 2021

Nonlinear QED Effects in X-ray Emission of Pulsars , S. Shakeri, M. Haghighat and She-Sheng
Xue,

JCAP 1710 (2017) no.10, 014 , [arXiv:1704.04750]

Polarization of a Probe Laser Beam due to the Nonlinear QED Effects. Soroush Shakeri, Seyed
Zafarollah Kalantari, She-Sheng Xue. 2017. 10 pp. Published in Phys.Rev. A95 (2017) no.1, 012108.

"On the universal late X-ray emission of binary-driven hypernovae and its possible collimation" G.B.

Pisani, R. Ruffini, Y. Aimuratov, C.L. Bianco, M. Kovacevic, R. Moradi, M. Muccino, A.V. Penacchioni,

J.A. Rueda, S. Shakeri Y. Wang. *Astrophys.J.* 833 (2016) no.2, 159 [arXiv:1610.05619]

"X-ray Flares in Early Gamma-ray Burst Afterglow" R. Ruffini, Y. Wang, Y. Aimuratov, L. Becerra, C.L. Bianco, M. Karlica, M. Kovacevic, L. Li, J.D. Melon Fuksman, R. Moradi, M. Muccino, A.V.

Penacchioni, G.B. Pisani, D. Primorac, J.A. Rueda, S. Shakeri, G.V. Vereshchagin, S.-S. Xue, *Astrophys.J.* 852 (2018) no.1, 53 [arXiv:1704.03821]

The binary systems associated with short and long gamma-ray bursts and their detectability, Jorge

Rueda, Y. Aimuratov, U. Barres de Almeida, L. Becerra, C.L. Bianco, C. Cherubini, S. Filippi, M. Karlica, M. Kovacevic, J.D. Melon Fuksman, R. Moradi, M. Muccino, A.V. Penacchioni, G.B. Pisani, D.

Primorac, R. Ruffini, N. Sabakyan, S. Shakeri, Y. Wang. *Int.J.Mod.Phys. D26* (2017) no.09, 1730016

The cosmic matrix in the 50th anniversary of relativistic astrophysics, R. Ruffini, Y. Aimuratov, L. Becerra, C.L. Bianco, M. Karlica, M. Kovacevic, J.D. Melon Fuksman, R. Moradi, M. Muccino, A.V.

Penacchioni, G.B. Pisani, D. Primorac, J.A. Rueda, S. Shakeri, G.V. Vereshchagin, Y. Wang, S.S. Xue, *Int.J.Mod.Phys. D26* (2017) no.10, 1730019

What can we learn from GRBs? Marco Muccino, Remo Ruffini, Yerlan Aimuratov, Laura M. Becerra, Carlo L. Bianco, Mile Karlica, Milos Kovacevic, Julio D. Melon Fuksman, Rahim Moradi, Ana V.

Penacchioni, Giovanni B. Pisani, Daria Primorac, Jorge A. Rueda, Soroush Shakeri, Gregory V.

Vereshchagin, She-Sheng Xue, Yu Wang *EPJ Web Conf.* 168 (2018) 01015

Revisiting the Statistics of X-ray Flares in Gamma-ray Bursts, Y. Wang, Y. Aimuratov, R. Moradi, M.

Peresano, R. Ruffini, S. Shakeri, *THESEUS Workshop 2017*, 05-06 Oct 2017. Naples, Italy [arXiv:1802.01693]

Relativistic Behavior and Equitemporal Surfaces in Ultra-Relativistic Prompt Emission Phase of

Gamma-Ray Bursts, Moradi, R.; Ruffini, R.; Bianco, C. L.; Chen, Y.-C.;

Karlica, M.; Melon Fuksman, J. D.; Primorac, D.; Rueda, J. A.; Shakeri, S.; Wang, Y.; Xue, S. S.

Astronomy Reports, Volume 62, Issue 12, pp.905-910, 2018

List of Publications Outside ICRANet before 2021

Circularly Polarized EM Radiation from GW Binary Sources. Soroush Shakeri, Alireza Allahyari, Published in *JCAP*11(2018)042, [arXiv:1808.05210]

Schwinger Effect in Anisotropic Inflation, Soroush Shakeri, Mohammad Ali Gorji and Hassan Fironzjahi, [arXiv:1903.05310] *Phys. Rev. D* 99, 103525 (2019)

Costantino Sigismondi

photo @ St Peter's Meridian line

Position: Professor

Period covered: 1-01-2021 13-01-2022



I Scientific Work

Research on historical meridian line of St Peter's square in Vatican (1586-1817) and the meridian line of St Maria degli Angeli in Rome (1702), from Classical Mechanics to General Relativity.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Marcel Grossmann Meeting XVI

Giornate di Geologia e Storia @ ISPRA 16 december 2021 Ghost Cities (Castrum Inui)

Dante Alighieri nel 700° anniversario della morte @ UPR4 15 april 2021

II b Work With Students

5D and 3D classes Liceo Galilei Pescara PCTO

1 A, B, C, D, F -ITIS Ferraris, Roma 2020-21 and 2021-22 Astronomy Project

II c Diploma thesis supervision @UPRA

Giorgio Rossi, Thesis on Tycho Brahe

Vincenzo Jannace, Thesis on Life in the Universe

II d Other Teaching Duties

Physics and Lab @ITIS G. Ferraris, Roma

Astrophysics Lab @ Sapienza University

History of Astronomy course 2021 @UPRA

III. Service activities

III a. Within ICRANet

Marcel Grossmann Meeting XVI, chair of the special session HR1 on Betelgeuse's Great Dimming of 2020

Liceo Galilei Pescara PCTO 40 hours online

ITIS Galileo Ferraris, Rome, Contest European Solar Telescope 2021 & I Lincei per il Clima science 2021

III b. Outside ICRANet

Physics and Lab (ITIS Galileo Ferraris)

Astrophysics Lab (Sapienza University of Rome)

History of Astronomy Course (UPRA-Ateneo Pontificio Regina Apostolorum,
Science and Faith Institute)

IV. Other

2021 List of Publications

Contribution to the Volume 108 della Memorie Descrittive della Carta Geologica D' Italia

https://www.isprambiente.gov.it/it/pubblicazioni/periodici-tecnici/memorie-descrittive-della-carta-geologica-ditalia/8-sigismondi_layout-1.pdf

Contributions to the volume 14 of Gerbertus (2021)

<http://www.icra.it/gerbertus/2021/Gerb-14-2021-totale.pdf>

Contributions to the Proceedings of the XVI Marcel Grossmann Meeting (2022, in press)

- A soccer school field sundial with 20 arcseconds accuracy to study the ecliptic
- Betelgeuse as didactic introductory tool for stellar variability, airmass computation and spectral analysis
- Betelgeuse, Sirius and the stars in the roman Settecento
- Celestial mechanics and variable stars before the telescope: from the meridian line of the Vatican obelisk (1586-1817), to the stars on Santa Maria degli Angeli meridian line (1702) in Rome.
- Fall and rise of Betelgeuse
- Solar astrometry at arcsecond level with a pencil, a meter and a watch at the Clementine Gnomon (1702)
- Sungrazing comets as General Relativistic gravitational probes
- The Clementine Gnomon (1702) recalibrated to measure stellar aberration

- The hypergiants VY Canis Majoris, Eta Carinae, V766 Centauri and the red supergiants Betelgeuse, Antares and Aldebaran in the 2.5K SGQ AAVSO database
- The three royal summer solstice markers unveiled at Santa Maria degli Angeli meridian line in Rome
- Visual observations of Betelgeuse near the solar conjunction

Yousef Sobouti



Position: **Founder, Institute for Advanced Studies in Basic Sciences (IASBS)**
Period covered: **1992**

Position: **Founding President, IASBS**
Period covered: **1992 – 2010**

Position: **Professor of Physics, Shiraz University**
Period covered: **1964 -1997**

Position: **Professor of Physics, IASBS**
Period covered: **1993 – 2020**

Position: **Founder, Biruni Observatory of Shiraz University**
Period covered: **1971**

Position: **Founding Director, Biruni Observatory of Shiraz University**
Period covered: **1971 – 1981**

Position: **Founder and Founding Director, Center for Research in Climate Change and Global Warming, IASBS**
Period covered: **2012 - present**

Position: **Fellow, The World Academy of Sciences (TWAS)**
Period covered: **1987 – present**

Position: **Fellow, Iran Academy of Sciences**
Period covered: **1988 – present**

I Scientific Work

- **Education:**

B.Sc., Physics, Tehran University, 1953

M.A., Physics, University of Toronto, 1960

Ph.D., Astronomy and Astrophysics, University of Chicago, 1963

- **Positions held:**

Lecturer, Dept. of Math., University of Newcastle on Tyne, 1963-1964

Associate Professor, Physics, Shiraz University, 1964-1970

Visiting Associate Professor, Astronomy, University of Pennsylvania, 1968-1969

Professor of Physics, Shiraz University, 1971 to 1999

Chairman, Physics Department, Shiraz University, 1972-1974 and 1978-1980

Visiting Senior Researcher, Astronomical Institute, University of Amsterdam, 1975-1976

Visiting Scholar, Astronomy and Astrophysics Center, University of Chicago, 1984-1985

Visiting Professor, Physics Department, Northeastern University, Boston, 1991-1992

Professor of Physics, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, Iran
1991- 2020

Academy of Sciences of Iran, Basic Sciences Branch, Head, 2012 - 2019

Adjunct Professor, International Center for Relativistic Astrophysics Network (ICRANET),
Pescara, Italy, 2015

- **Publications (Papers)**

1. Sobouti, Y., “Three arguable and interrelated concepts: point particle singularity, asymmetric action of EM on quantum wave functions, and the Left out restricted Lorentz gauge from $U(1)$ ”, arXiv:1507.06393v2 [physics.class-ph], (2022).
2. Sobouti, Y., “Massive Gravity as an Alternative Gravity”, Gravitation and Cosmology, Vol. 26, Number 1, pp. 1–6, (2020)
3. Sobouti, Y., “An Oscillator representation of elementary particles”, J. Phys. Communication, Journal of Physics Communications, Volume 2, Number 8 (2018)2.
4. Sobouti, Y., Jahani Poshteh, M. B., “A cosmological model with time varying cosmological constant”, (2017).
5. Sobouti, Y., “Harmonic Oscillators and Elementary Particles”, arXiv:1608.04598v1 [physics.gen-ph], (2016).
6. Sobouti, Y., “Lorentz Covariance ‘almost’ implies electromagnetism and more”, Eur. J. Phys. 17 180–2. IOPscience, (2015), arXiv:1507.06393 [physics.class-h].
7. Sobouti, Y., "Minimalist's Electromagnetism - Different Axioms and Different Insight",

1-4, (2013).

8. Moravveji, E., Guinan, E. F., Sobouti, Y., "On the Mass and Evolutionary Status of the Bright Red AGB Supergiant α^1 Herculis" in Why Galaxies Care about AGB Stars II: Shining Examples and Common Inhabitants, Edited by F. Kerschbaum, T. Lebzelter, and R.F. Wing. San Francisco, Proceedings of a conference held at University Campus, Viena, Austria, 16-20 August 2010, Astronomical Society of the Pacific, 2011, 163-164, (2010).
9. Sobouti, Y., "Dark Companion of Baryonic Matter in Spiral Galaxies" in DARK MATTER IN ASTROPHYSICS AND PARTICLE PHYSICS, Edited by Hans Volker Klapdor-Kleingrothaus, Irina V Krivosheina, Proceedings of the 7th International Heidelberg Conference on Dark 2009. Held 18 - 24 January 2009 in Christchurch, New Zealand, Published by World Scientific Publishing Co. Pte. Ltd., 2010. ISBN: 9789814293792, 356-362, (2010).
10. Sobouti, Y., "Dark companion of baryonic matter in spiral galaxies", arXiv:0812.4127 [gr-qc], 1-3, (2008).
11. Hasani Zonoozi, A., Haghi, H., Sobouti, Y., "Distinguishing between different alternative theories of gravity, using different IMF's in stellar population synthesis models", 14th Meeting on Research in Astronomy at IASBS, (2010).
12. Hasani Zonoozi, A., Haghi, H., Sobouti, Y., "Stellar population synthesis, a discriminant between gravity models", Astron. & Astrophys., 1-13, (2010).
13. Sobouti, Y., Hasani Zonoozi, A., Haghi, H., "Tully-Fisher relation, key to dark companion of baryonic matter", Astron. & Astrophys. (A&A), 507: (2), 635-638, (2009).
14. Sobouti, Y., "Dark companion of baryonic matter - Logarithmic potentials are inherent to GR", arXiv:0812.4127v1 [gr-qc], 1-4, (2009).
15. Sobouti, Y., "Dark companion of baryonic matter-Beyond the point source", (2009).
16. Sobouti, Y., "Dark companion of Baryonic matter, III", arXiv:0903.5007v1 [gr-qc], 1-4, (2009).
17. Sobouti, Y., "Revised Dynamics or Dark Matter in Galactic and Extra Galactic Scales?", Astronomy & Astrophysics (A & A), (2008).
18. Sobouti, Y., "The Morality of Exact Sciences", Science and Technology and the Future

Development of Societies: International Workshop Proceedings 2008, 10-13, (2008).

19. Sobouti, Y., "The Morality of the Exact Sciences", To appear in the proceedings of the "Interacademy Workshop on Science & Technology and the Future Development of Societies", Fondation des Treilles, Nice, June 26 - July 1, (2006).
20. Sobouti, Y., "Dark Companion of Baryonic Matter", arXiv:0810.2198v1 [gr-qc], 1-4, (2008).
21. Sobouti, Y., "Review of Cosmic Anger: Abdus Salam — the First Muslim Nobel Scientist", MAA Online (The Mathematical Association of America), Publisher: Oxford University Press, ISBN: 9780199208463, 1-305, (2008).
22. Sobouti, Y., "a $f(R)$ Gravitation for Galactic Environments" in THE ELEVENTH MARCEL GROSSMANN MEETING On Recent Developments in Theoretical and Experimental General Relativity, Gravitation and Relativistic Field Theories, Edited by Hagen Kleinert, Robert T Jantzen, Proceedings of the MG11 Meeting on General Relativity. Held 23-29 July 2006 in Berlin, Germany, Published by World Scientific Publishing Co. Pte. Ltd., 2008. ISBN: 9789812834300, 1230-1232, (2008).
23. Sobouti, Y., "An $f(R)$ Gravitation for Galactic Environments", Proceedings of the International Astronomical Union, Volume 2, Issue S238 (Black Holes from Stars to Galaxies – Across the Range of Masses), Published online by Cambridge University Press: 01 August 2006, 451-452, (2006).
24. Sobouti, Y., "An $f(R)$ Gravitation for Galactic Environments", Galaxy Evolution Across the Hubble Time, Edited by F. Combes and J. Palous, Proceedings of the International Astronomical Union 2, IAU Symposium No.235, held 14-17 August, 2006 in Prague, Czech Republic. Cambridge: Cambridge University Press, 2007, 138-138, (2007).
25. Sobouti, Y., "An $f(R)$ Gravitation for Galactic Environments", Astron. & Astrophys. (A&A), 464: (3), 921-925, (2007).
26. Dadashi, N., Safari, H., Nasiri, S., Sobouti, Y., "Exact solutions for standing kink modes of the longitudinally stratified coronal loops", Solar Physics, arXiv:0802.1322v1 [astro-ph], 1-10, (2008).
27. Rahvar, S., Sobouti, Y., "An Inverse $f(R)$ Gravitation for Cosmic Speed up, and Dark Energy Equivalent", Mod.Phys.Lett.A, 23: (23), 1929-1937, (2008).
28. Ter-Kazarian, G. T., Sobouti, Y., "An Extended Phase-Space Stochastic Quantization of Constrained Hamiltonian Systems", J. Phys. A: Math. Theor., 41: (31), 315303-1-315303-

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29. Etemad, Sh., Sobouti, Y., "Trends in Basic Sciences in Contemporary Iran: Growth and Structure of Mainstream Basic Sciences", In Science and Technology and the Future Development of Societies, Editor: Glenn Schweitzer, National Research Council of the National Academies, the National Academies Press, Washington, D. C., 24-30, (2008).
30. Sobouti, Y., "Trends in Basic Sciences in Contemporary Iran: The Growth and Cognitive Structure of Mainstream Basic Sciences", To appear in the proceedings of the "Interacademy Workshop on Science & Technology and the Future Development of Societies", Fondation des Treilles, Nice, June 26 - July 1, (2006).
31. Sobouti, Y., "Astronomy in Iran", Proceedings of the International Astronomical Union 2(SPS5), August 2007, 147-148, (2007).
32. Sobouti, Y., "Astronomy in Iran", Suppl. J. Astrophys. Astr., 16, 469-, (1995).
33. Safari, H., Nasiri, S., Sobouti, Y., "Oscillations of longitudinally density stratified coronal loops", Astronomy & Astrophysics, arXiv:astro-ph/0605566v2, 1-6, (2006).
34. Sobouti, Y., "An $f(R)$ gravitation instead of dark matter", Astron. & Astrophys. (A&A), (2006).
35. Sobouti, Y., "The Effect of Density Stratification on the Modal Structure of Solar Coronal Loops", 26th meeting of the IAU, Joint Discussion 3, 16-17 August, 2006, Prague, Czech Republic, JD03, 45-45, (2006).
36. Sobouti, Y., "Revised Dynamics or Dark Matter in Galactic Scales?", Edited by W. Sutantyo; P.W. Premadi; P. Mahasena; T. Hidayat and S. Mineshige, The 9th Asian-Pacific Regional IAU Meeting, held in Nusa Dua, Bali, Indonesia, 26-29 July 2005. ISBN: 979-3507-63-2, Publisher: Institut Teknologi Bandung Press, 2006, 218-218, (2006).
37. Safari, H., Nasiri, S., Karami, K., Sobouti, Y., "Resonant Absorption in Dissipative Flux Tubes", Astron. & Astrophys. (A&A), 448: (1), 375-378, (2006).
38. Nasiri, S., Sobouti, Y., Taati Asil, F., "Phase Space Quantum Mechanics – Direct", J. Math. Phys., 47: (9), 092106-1-092106-15, (2006).
39. Sobouti, Y., "Alternative Dynamics or Dark Matter", The 9th Asian Pacific Reginal IAU

Meeting (APRIM 2005), July 26-29, Bali, Indonesia, (2005).

40. Sobouti, Y., "Dynamics of Compact Objects", Proceedings of 10th IASBS Conference on Astronomy, Feb. (2005).
41. Sobouti, Y., "Dark matter or the other dynamics", Iranian Journal of Physics Research, 5: (3), 113-119, (2005).
42. Sobouti, Y., Karami, K., Nasiri, S., "Flux Tube Oscillations and Coronal Heating", IAU 8th Asian-Pacific Regional Meeting, 1, 409-412, (2003).
43. Sobouti, Y., "Symmetries and eigensolutions of Liouville's equation", 22nd International Colloquium on Group Theoretical Methods in Physics, 13-18 Jul 1998. Hobart, Tasmania, Australia, 569-575, (1998).
44. Sobouti, Y., "Symmetries and eigensolutions of Liouville's equation", Proceedings, 23rd International Colloquium on Group Theoretical Methods in Physics (GROUP 23): Dubna, Russia, July 31-August 5, 2000, 569-575, (2000).
45. Karami, K., Nasiri, S., Sobouti, Y., "Normal Modes of Magnetic Flux Tubes and Dissipation", Astron. & Astrophys. (A&A), 396: (3), 993-1002, (2002).
46. Sobouti, Y., "Eigensolutions of Antonov's Equation" in Stellar Dynamics: From Classic to Modern, Proceedings of the International Conference held in Saint Petersburg, August 21-27, 2000, 379-384, (2000).
47. Sobouti, Y., "Symmetries and Eigensolutions of Liouville's Equation, in Group Theoretical Methods in Physics", Joint Institute for Nuclear Research in press, (2001).
48. Sobouti, Y., Rezania, V., "The r-modes of rotating fluids", Astron. & Astrophys., 375: (2), 680-690, (2001).
49. Sobouti, Y., Rezania, V., "The R-Modes of Rotating Fluids", J. Royal Astron. Soc. Canada, 95: (4), 155-, (2001).
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52. Sobouti, Y., Rezaia, V., "Normal modes of relativistic systems in postNewtonian approximation", arXiv:astro-ph/9804131v1, 1-22, (1998).
53. Sobouti, Y., "Contemporary Astronomy in Iran - A Status report", Highlights of Astronomy Vol. 11A, as presented at Joint Discussion 14 of the XXIIIrd General Assembly of the IAU, 1997. Edited by Johannes Andersen. Kluwer Academic Publishers, 1998., 739-739, (1998).
54. Khosroshahi, H.G., Sobouti, Y., "Angular momentum transfer to a star by gravitational waves", 15th International Conference on General Relativity and Gravitation (GR15), arXiv:astro-ph/9806102v1, 1-5, (1997).
55. Sobouti, Y., Nasiri, S., "A Canonical Quantization in Phase Space Frontiers in Theoretical Physics", Turkish. J. phys., 19: (1), 458-464, (1995).
56. Sobouti, Y., "A quantization procedure in phase space resulting from symmetric treatment of configuration and momentum representations", 7th International Conference on Symmetry Methods in Physics, 10-16 Jul 1995, Dubna, Russia, (1995).
57. Sobouti, Y., Dehghani, M. H., "A Lie Algebra of the Symmetries of Liouville's Equation", International Astronomical Union Colloquium, 132, 233-239, (1993).
58. Sobouti, Y., Nasiri, S., "A PHASE SPACE FORMULATION OF QUANTUM STATE FUNCTIONS", Int. J. Mod. Phys. B, 7: (18), 3255-3272, (1993).
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60. Hasan, S. S., Sobouti, Y., "Classification of magnetoatmospheric modes in sunspot umbrae", Solar Photosphere: Structure, Convection, and Magnetic Fields Proceedings of the 138th Symposium of the International Astronomical Union Held in Kiev, USSR, May 15-20, 1989, Stenflo, Jan (Ed.), 255-258, (1990).
61. Sobouti, Y., "Nonequilibrium ensembles: I. A Lagrangian formalism for classical systems", Physica A, 168: (3), 1021-1034, (1990).
62. Sobouti, Y., "Nonequilibrium ensembles. 2. A Lagrangian formalism for quantum systems", INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS, Trieste (Italy), IC-90-184, 1-15, (1990).

63. Sobouti, Y., Khajeh-Pour, M.R.H., "Nonequilibrium ensembles. 3. Spin 1/2 paramagnets", International Centre for Theoretical Physics, Trieste (Italy), IC-90-185, 1-8, (1990).
64. Sobouti, Y., "Liouville's equation. I- Symmetries and classification of modes", *Astron. & Astrophys.*, 210: (1-2), 18-24, (1989).
65. Sobouti, Y., "Liouville's Equation. II- Eigenmodes of Harmonic Potentials", *Astron. & Astrophys.*, 214: (1-2), 83-91, (1989).
66. Sobouti, Y., Samimi, J., "Liouville's Equation. III- Symmetries of the Linearized Equation", *Astron. & Astrophys.*, 214: (1-2), 92-98, (1989).
67. Sobouti, Y., Samimi, J., "LIOUVILLE'S EQUATION: 3. SYMMETRIES OF THE LINEARIZED EQUATION", International Atomic Energy Agency (IAEA), IC/88/160, International Centre for Theoretical Physics, Trieste (Italy), 1-18, (1988).
68. Sobouti, Y., "Maximum entropy nonequilibrium distributions", 17 IUPAP International Conference on Thermodynamics and Statistical Mechanics, Rio de Janeiro, RJ (Brazil), 31 Jul - 4 Aug, (1989).
69. Sobouti, Y., "A LAGRANGIAN FORMALISM FOR NONEQUILIBRIUM ENSEMBLES", International Centre for Theoretical Physics, Trieste (Italy), IC/89/231, 1-9, (1989).
70. Sobouti, Y., "Symmetries of Liouville's Equation", *Transactions of the International Astronomical Union: Proceedings of the Twentieth General Assembly*, Baltimore (1988).
71. Sobouti, Y., Nasiri, S., "The normal modes of oscillations of fluids in the presence of magnetic fields", *Vistas in Astronomy*, 31: (1), 425-429, (1988).
72. Sobouti, Y., Ardakani, A. B., "Excitation of the normal modes of a binary member by its companion", *Vistas in Astronomy*, 31: (1), 351-355, (1988).
73. Sobouti, Y., "Radial and Non-Radial Oscillations of Spherically Symmetric Stellar Systems", *Advances in Helio- and Astroseismology: Proceedings of the 123th Symposium of the International Astronomical Union, Held in Aarhus, Denmark, July 7-11, 1986*, Chapter 2, ISBN: 978-90-277-2615-5 , 123, 191-194, (1988).
74. Sobouti, Y., "Radial and non-radial oscillations of spherically symmetric stellar systems", International Atomic Energy Agency (IAEA), IC--86/185, (1986).

75. Sobouti, Y., "Linear oscillations of isotropic stellar systems. III - A classification of non-radial modes", *Astron. & Astrophys.*, 169: (1-2), 95-110, (1986).
76. Sobouti, Y., "Linear Density Waves in Globular Clusters", *The Harlow-Shapley Symposium on Globular Cluster Systems in Galaxies: Proceedings of the 126th Symposium of the International Astronomical Union, Held in Cambridge, Massachusetts, U.S.A., August 25–29, 1986, Chapter X, ISBN: 978-90-277-2665-0 , 126, 693-693, (1986).*
77. Sobouti, Y., "Linear oscillations of isotropic stellar systems. II - Radial modes of energy-truncated models", *Astron. & Astrophys.* , 147: (1), 61-66, (1985).
78. Sobouti, Y., "Linear oscillations of isotropic stellar systems. I- Basic theoretical considerations", *Astron. & Astrophys.* , 140: (1), 82-90, (1984).
79. Sobouti, Y., "Radial and nonradial Oscillations of spherically symmetric isotropic stellar system-Solution of Antonov's equation", 165th AAS Meeting, Tucson, Arizona, 16, 997-, (1984).
80. Sobouti, Y., " The Potentials for the g-, p-, and the Toroidal Modes of Self-gravitating Fluids", *Astron. & Astrophys.*, 100, 319-322, (1981).
81. Sobouti, Y., Heydari Khajepour, M. H., Dixit, V. V., "Normal modes of white dwarfs in Current problems in stellar pulsation instabilities", *NASA Memorandum*, 80625-513-80625-531, (1980).
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86. Sobouti, Y., "A definition of the g- and p-modes of self-gravitating fluids", *Astron. & Astrophys.*, 55, 327-337, (1977).
87. Sobouti, Y., "Pure Perturbation Spectra of Convectively Neutral Fluids", *Astron. & Astrophys.*, 55, 339-346, (1977).
88. Sobouti, Y., "The G and P modes of polytropes", *Astron. & Astrophys., Suppl.*, 28, 463-468, (1977).
89. Sobouti, Y., Silverman, J. N., "An Expansion of Normal Modes of Self-Gravitating Fluids", *Abstract in Bull. Am. Astron. Soc.*, 9, 338-338, (1977).
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91. Sobouti, Y., "On long-period hydromagnetic oscillations of selfgravitating compressible masses", *Bulletin of the Astronomical Society*, Vol. 6, p. 488, (1974).
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93. Sobouti, Y., "On a Bernoulli's integral pertaining to gas flow in close binary systems", *Astrophys. Space Sci.*, 12: (2), 408-410, (1971).
94. Sobouti, Y., "A Potential Flow Pertaining to Binary Systems", *Astron. & Astrophys.*, 5, 149-154, (1970).
95. Sobouti, Y., "Scattering and Transmission Functions for Non-Coherent Scattering", *Astrophys. J.*, 153, 257-266, (1968).
96. Sobouti, Y., "Fluorescent Scattering in Planetary Atmospheres. III. Formation of Lyman-Birge Bands of $N_{\{2\}}$ in the Martian Atmosphere", *Astrophys. J.*, 138, 720-747, (1963).
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 103. Schweitzer, G., Sobouti, Y., (Editors), "Science as a Gateway to Understanding: International Workshop Proceedings, Tehran, Iran", Publisher: The National Academies Press Washington D.C., ISBN: 0-309-12880-3 , 1-184, (2008).
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- Potentials", *Astron. Astrophys.*, 299, 293-296, (1995).
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 119. Silverman, J. N., Sobouti, Y., "Normal modes of self gravitating fluids in perturbed configurations, II. Perturbational-variational expansion of the g- and p- modes of a nonadiabatic fluid about the adiabatic limit", *Astron. & Astrophys.*, 62, 365-374, (1978).
 120. Chamberlain, J. W., Sobouti, Y., "Fluorescent Scattering in Planetary Atmospheres. I. Basic Theoretical Considerations", *Astrophys. J.*, 135, 925-937, (1961).
 121. Nasiri, S., Safari, H., Sobouti, Y., "Damping of MHD Waves as Heating Mechanism of Solar Corona", *Solar and Stellar Physics Through Eclipses ASP Conference Series*, Vol.

370, proceedings of the conference held 27-29 March, 2006 at Ankara University, ÖRSEM Campus, Side, Antalya, Turkey. Edited by O. Demircan, S. O. Selam, and B. Albayrak. San Francisco, 370, 68-73, (2007).

122. Safari, H., Nasiri, S., Sobouti, Y., "Fast Kink Modes of Longitudinally Stratified Coronal Loops", *Astron. Astrophys. (A&A)*, 470, 1111-1116, (2007).

123. Barut, Ao., Cruz, M. G., Sobouti, Y., "Localized Solutions of the Linearized Gravitational-Field Equations in Free-Space", *Classical Quant. Grav*, 11: (10), 2537-2543, (1994).

124. Moravveji, E., Guinan, E. F., Wasatonic, R., Sobouti, Y., Nasiri, S., "Investigating the Semi-Regular Light Variations of the bright M5 supergiant: α Herculis", *Astrophys. Space Sci.*, 328: (1), 113-117, (2010).

125. ثبوتی، ی. "زمین گرم می‌شود" (1390). انتشارات موسسه جغرافیایی و کارتوگرافی گیتا شناسی، شماره چاپ ۱. ۲۳۳-۱. ایران.

126. ثبوتی، ی. "ماده تاریک یا دینامیک دیگر؟" (۱۳۸۴). مجله پژوهش فیزیک ایران. ۵: (۳)، ۱۱۹-۱۱۳. ایران.

127. Sobouti, Y., "Iran's commitments toward meeting the goals of Paris Agreement: harnessing the global temperature rise", *Региональные проблемы*, 21(3 (1)), 112-114, (2018).

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• Publications (Books)

1. Warmed Earth: What has the climate of the 21st Century to offer, Gita Shenasi Press, Tehran, (a book on climate change for Persian speaking communities), 2011.
2. Relativity: Special and General (a graduate-student textbook in Persian), Iran University Press, 2018.

3. Science the Gateway to Understanding, Proceedings of the Workshop on, Tehran, October 2008, Editors: Glenn Schweitzer and Yousef Sobouti, The National Academies Press, Washington, D.C., 2008.
4. Stellar Evolution (by Jack Meadows), translation (1984), Dena Press, Iran.
5. Thermal physics (Book by Philip M. Morse), translation (1993), Nashre Daneshgahi Press, Iran.
6. Commitments of the Islamic Republic of Iran to Climate Change. (2017). (2015 Paris Conference), on the order of the Researchers Support Fund, Letter of the Academy of Sciences, Iran.
7. Letter of the Academy of Sciences, Iran. Journal of the Academy of Sciences of the Islamic Republic of Iran. No. 3, (Summer 2018). Academy of Sciences Publications.
8. Thermodynamics and Statistical Mechanics, (2020), (Revisions and additions are in progress).

II Conferences and educational activities

II a Conferences and Other External Scientific Work

• Conferences (recent)

- Scientific Committee Member of 7th Regional Conferences on Climate Change and Global Warming, Center for Research in Climate Change and Global Warming, IASBS, 2022
- Scientific Committee Member of ICRANet-ISFAHAN Astronomy Meeting, November 2021
- Scientific Committee Member of 6th Regional Conferences on Climate Change and Global Warming, Center for Research in Climate Change and Global Warming, IASBS, 2021
- Scientific Committee Member of 23rd National Meetings on Research in Astronomy, IASBS, 2020

• Major contributions to institutional developments

- Responsible for the initial conception and realization of Biruni Observatory, Shiraz University, Shiraz, Iran 1971-1975, and Director of the Observatory, 1975-1980
- Responsible for the creation and development of graduate studies in physics (M.Sc., 1967 and Ph.D., 1986), Shiraz University, Shiraz, Iran

- Responsible for the initial conception and creation of Institute for Advanced Studies in Basic Sciences, Gava Zang, Zanzan, Iran, 1991, Director, 1991-2010
 - Responsible for the initial conception and creation of Abdul - Rahman Sufi College (a private 1st degree college science and humanity), 2004, Head of the Board of Trustees, 2004 - present
 - Founding member of the Physical Society of Iran, 1983-present
 - Founding member of the Astronomical Society of Iran, 1987-present
 - Founding member of the Iranian Society of Ethics in Science and Technology, 2004-present
-
- **Memberships and fellowships in societies and scientific organizations**
 - Founding member and member of the Board of Directors of the Physical Society of Iran, 1983-1988, President, 1989-1991 and 1996-2000
 - Founding member of the Astron. Soc. of Iran, 1987, President 1987-1993 and 1996-9
 - Member of the American Astronomical Society, 1968-2002
 - Member of the International Astronomical Union, Commissions 28, 35, 1969 present
 - Founder of Birouni Observatory, Shiraz, Iran, 1971
 - Iranian Journal of Science and Technology, Board of Advisors, 1971-1976, Board of Editors 1983 -1990
 - Iranian Journal of Physics, Board of Advisors, 1987 - present
 - Member of the Third world Academy of Science, 1987 - present
 - Member of the Academy of Sciences of Iran, 1989 - present
 - Member of the Scientific Council, International Center for Theoretical Physics, Trieste, Italy, appointed by UNESCO and IAEA, 1989-1992
 - Founder of Institute for Advanced Studies in Basic Sciences, Zanzan, Iran 1991
 - Member of Board of Trustees of The Regional Library of Science and Technology, appointed by the Ministry of Culture and Higher Education of Iran, 1991-1998
 - Member of the Board of Trustees of the University of Medical Sciences of Zanzan, 2004
 - Member of Technical Advisory Committee of Commission on Science and Technology for Sustainable Development in the South (COMSATS), 2004

- Member of the International Advisory Committee, Marcel Grossmann Meetings, a la Sapienza-based (Rome, Italy) annual conference in Honor of Marcel Grossman, the mathematician who helped Einstein to formulate his General Relativity, 2006 – present
- Founder of Sufi School of Business, a graduate school, stationed in Zanjan, in progress since 2015

II b Work with Students

II c Diploma thesis supervision

- Over 50 students, between 1964 to 1990
- After 1990 to 2018:

Supervision:

1. Mehdi Haghi, MSc, Thesis title: “Symmetries of the Liouville equation for the simple coordinate potential”, Shiraz University, Graduation date: 1990
2. Amir Hosein Fariborz, MSc, Thesis title: “Outdoor synchronous oscillator”, Shiraz University, Graduation date: 1990
3. Mansour Haghighat, MSc, Thesis title: “Eigenvalues of Liouville operator functions with simple coordinate potential”, Shiraz University, Graduation date: 1990
4. Mohammad Ali Hoseinpour Feizi, MSc, Thesis title: “Chaos in simple quantum systems”, Shiraz University, Graduation date: 1990
5. Ali Mohammad Jamilzadeh, MSc, Thesis title: “Chaos in classical dynamical systems”, Shiraz University, Graduation date: 1990
6. Sadollah Nassiri Gheydari, PhD, Thesis title: “Cannon formulation of quantum statistical mechanics”, Shiraz University, Graduation date: 1992
7. Mohammad Hosein Dehghani, PhD, Thesis title: “Liouville Equation Symmetry Group”, Shiraz University, Graduation date: 1992
8. Javad Tahmasebi Birgani, PhD, Shiraz University, Graduation date: 1992
9. Hasan Ranjbar Asgari, MSc, Thesis title: “Spherical solutions of Brans-Dicke equations”, Shiraz University, Graduation date: 1994

10. Hamid Reza Khalesifard, PhD, Thesis title: "Two wave mixing as a new method for measurement of nonlinear refractive index", Shiraz University, Graduation date: 1996
11. Mansour Haghighat, PhD, Thesis title: "Heavy Hadron weak decay form factors", Shiraz University, Graduation date: 1996
12. Hossein Hakimi Pajouh, MSc, Thesis title: "Phase Transition and Dynamic Exponents for Convective Motions in Nondissipative Fluids", IASBS, Graduation date: 1995
13. Reza Alemi, MSc, Thesis title: "Quantum Behavior of Accelerated Electrons as Dissipative Quantum System", IASBS, Graduation date: 1995
14. Malek Zareyan, MSc, Thesis title: "Dirac Equation in the Randers Metric and Hydrogen Atom in the Finslerian Formalism", IASBS, Graduation date: 1995
15. Ali Nayeri, MSc, Thesis title: "Tethered Surfaces and Space-Time: A Model for the Universe", IASBS, Graduation date: 1995
16. Habib Gharar Khosroshahi, MSc, Thesis title: "The effect of gravitational waves on stars", IASBS, Graduation date: 1996
17. Mahmood Hoseini Farzad, PhD, Thesis title: "Four-wave vortex combination without approximation of slow amplitude changes and its quantum properties", Shiraz University, Graduation date: 1996
18. Morteza Bayat, MSc, Thesis title: "Classification of Certain Plane Curves Satisfying $R=f(d)$ ", IASBS, Graduation date: 1996
19. Hassan Firuzjahi, MSc, Thesis title: "Patterns Formation in Statistical Description of Hydrodynamical Instabilities", IASBS, Graduation date: 1997
20. Peyman Ahmadi, MSc, Thesis title: "Long Period Magnetic Phenomena in the Sun as Hydromagnetic Modes of Oscillation", IASBS, Graduation date: 1998
21. Mohammad Rahim Bordbar, MSc, Thesis title: "An Introduction to flame spectrophotometry", Shiraz University, Graduation date: 1998
22. Maziyar Khosravi, MSc, Thesis title: "Boson stars in post-Newtonian approximation and poly-tropical structure", Shiraz University, Graduation date: 1998
23. Arezoo Dianat, MSc, Thesis title: "Hydrogen Atom in Friedmann Universe", IASBS, Graduation date: 1999

24. Vahid Rezaia, PhD, Thesis title: "Normal Modes of Relativistic Systems in Postnewtonian Approximation and The stability Curve of r - Modes in Neutron Stars", IASBS, Graduation date: 1999
25. Shahram Abbasi, MSc, Thesis title: "A Study of g -Modes of Oscillation of the Sun", IASBS, Graduation date: 2000
26. Yousef Ali Aabedini, PhD, Thesis title: "Free earth oscillations", IASBS, Graduation date: 2000
27. Ahmad Hosseini Zadeh, MSc, Thesis title: "Brightness Fluctuations in Globular Clusters", IASBS, Graduation date: 2001
28. Kayoomars Karami, PhD, Thesis title: "Coronal Heating by Damping of MHD Waves and Third Order Effect of Rotation on Stellar Oscillations", IASBS, Graduation date: 2003
29. Jalil Naji Damirani, MSc, Thesis title: "Mass Distribution Function for Self-Gravitating Spherical System", IASBS, Graduation date: 2004
30. Hosein Safari, PhD, Thesis title: "Solar Coronal Plasma Heating I. Loops Oscillations and Resonant Absorption II. Nano-Flares Heating", IASBS, Graduation date: 2006
31. Fatemeh Taati Asil, PhD, Thesis title: "Phase Space Quantum Mechanics-An Extended Phase Formalism Approach", IASBS, Graduation date: 2006
32. Hadi Rahmani Baygi, MSc, Thesis title: "Long Term Luminosity Variations and Orbital Period Changes in CG Cyg", IASBS, Graduation date: 2006
33. Seyed Hossein Razizadeh, MSc, Thesis title: "A Chromospheric Activity Study of the Binary Star ER Vul Peculae", Zanzan University, Graduation date: 2006
34. Akram Hassani Zonoozi, PhD, Thesis title: "I. Initial Mass Function: a Distinguishing Factor for Gravity Models II. The Flattening of the Mass Function of the Globular Cluster Palomar 14", IASBS, Graduation date: 2011
35. Zohreh Ghaffari, MSc, Thesis title: "Metallicity of Starburst Galaxies in Chandra Deep Field South (CDF-S)", IASBS, Graduation date: 2011
36. Parvin Mostafavi, MSc, Thesis title: "Physical Characteristics of Early Type Galaxies at Redshift $0.3 < z < 1$ ", IASBS, Graduation date: 2011
37. Ehsan Moravveji, PhD, Thesis title: "Analysis of the Observational Data of the Blue Supergiant Star Rigel: An Asteroseismological Approach", IASBS, Graduation date: 2012

38. Amir Naghavi Azad, MSc, Thesis title: "Projecting the Climate of Iran and Its Geographical Neighbours Using Regional Climate Model (RegCM)", IASBS, Graduation date: 2013
39. Mehdi Mahmoodi, MSc, Thesis title: "Planetary Atmospheres in Solar System", IASBS, Graduation date: 2014
40. Mahdi Yousefzadeh Soraki, MSc, Thesis title: "Automatic Identification of Supergranular Cell Boundaries", IASBS, Graduation date: 2014
41. Roohollah Lotfi, MSc, Thesis title: "Study of the atmosphere of the planets of the solar system", Abdolrahman Sufi Razi Higher Educational Institute, Graduation date: 2014
42. Nasim Ildartanha, MSc, Thesis title: "Reconstructing the Solar Magnetic Field by a Lagrange Multiplier Technique Subject to the Helicity Conservation", IASBS, Graduation date: 2015
43. Rasul Darvishizadeh, MSc, Thesis title: "Forecast of Iran's climate and its geographical neighbors from 2010 to 2030 using RegCM regional model", IASBS, Graduation date: 2015
44. Behzad Tahmasebzadeh, MSc, Thesis title: "Inflationary Cosmological Models in Scalar-Tensor Gravity", IASBS, Graduation date: 2015
45. Zahra Ghafourizadeh, MSc, Thesis title: "The Effect of Dark Energy on Dynamics of Galaxy Clusters", IASBS, Graduation date: 2015
46. Saeed Rajani, MSc, Thesis title: "Perturbed Metric and its Application in Cosmology", IASBS, Graduation date: 2016
47. Mohammad Bagher Jahani Poshteh, PhD, Thesis title: "Black Holes in Horava-Lifshitz and Einsteinian Cubic Gravities: Thermodynamics, Phenomenology", IASBS, Graduation date: 2018

Advisor:

48. Habib Gharar Khosroshahi, PhD, Thesis title: "The Photometric Plane of Galaxies", IASBS, Graduation date: 2000
49. Iraj Gholami Ghadikolaei, MSc, Thesis title: "A New Technique to Study the Variability of the Sun and Data Analysis", IASBS, Graduation date: 2001
50. Mahyar Madadi, PhD, Thesis title: "Lattice Boltzmann Simulation of Fluid Flow and Dispersion in Fracture Networks With Self-Affine Surface", IASBS, Graduation date: 2002

51. Mohammad Taghi Mirtorabi, PhD, Thesis title: “Near Infrared Tio Band and Visual Photometry of Pulsating Giant and Chromospherically Active Stars”, Zanzan University, Graduation date: 2002
52. Sharareh Tavaddod, MSc, Thesis title: “Correction of Tip-Tilt Aberration with Adaptive Optics”, IASBS, Graduation date: 2003
53. Ebrahim Karimi, MSc, Thesis title: “A Study on Laser Cooling and Trapping of Neutral Atoms”, IASBS, Graduation date: 2003
54. Rozita Mohebbi, MSc, Thesis title: “Velocity Curve Analysis of the Spectroscopic BINARY Stars”, IASBS, Graduation date: 2006
55. Narges Fathalian, MSc, Thesis title: “Investigation of Galactic Disks Rotation Curve in Modified Gravity”, IASBS, Graduation date: 2006
56. Hossein Teimoorinia, PhD, Thesis title: “Physical Properties of Distant Galaxies from Spectro-Photometric Analysis of Multi-Wavelength, Multi-Observatory Deep Surveys”, IASBS, Graduation date: 2010
57. Fateme Amirkhanlou, MSc, Thesis title: “Segmentation of Solar Coronal Image; Application of Neural Networks”, IASBS, Graduation date: 2010
58. Mostafa Rajabi Ebgha, MSc, Thesis title: “Measurement of Tree Growth Using Moire Technique”, IASBS, Graduation date: 2012

II d Other Teaching Duties

- Teacher, High school, Tabriz, Iran, 1953-1956
- Teacher, Cartographic Organization of Iran, Tehran, 1956-1958
- Teaching various physics courses, Shiraz University, 1964 - 1988
- Teaching Physics courses (such as Quantum Mechanics, Gravity, Electrodynamics, Classical Mechanics, General Relativity, Structure and Evolution of Galaxies, Climate Change and Global Warming, Special Relativity, Symmetry and Principles of Conservation and Continuity Equations, statistical mechanics, Thermodynamics), IASBS, Zanzan, 1991 to present

II e Work with Postdocs

1. “Calculate the torque applied to spherical particles, Double break in optical tweezers”, Researcher: Ibrahim Madadi, Supervisor: Prof. Yousef Sabouti, Start Date: 2013/08/23, Date of Completion: 2013/11/21, Admission of postdoctoral researcher Allameh Tabatabai Award of the National Elite Foundation.

2. “Modeling and Assessment Time Series Climate Data in National and Regional Level Using Neural Network and Comparing with IPCC Projections”, Researcher: Fereshteh Jadari, Supervisor: Prof. Yousef Sabouti, Start Date: 2014/08/23, Date of Completion: September 2015, Admission of postdoctoral researcher Allameh Tabatabai Award of the National Elite Foundation.
3. “Development and application of new Chemometric methods for the Assessment of effects of global change on natural systems from environmental monitoring and climate change data”, Researcher: Mahsa Dadashi, Supervisor: Prof. Yousef Sabouti, Start Date: 2014/05/22, Date of Completion: May 2015, Admission of postdoctoral researcher Allameh Tabatabai Award of the National Elite Foundation.
4. “Study of noncommutativity on the scalar field models and its role in accelerated expansion of the Universe”, Researcher: Heidar Sheikh Ahmadi, Supervisor: Prof. Yousef Sabouti, Start Date: 2015/09/23, Date of Completion: July 2017, Admission of postdoctoral researcher Allameh Tabatabai Award of the National Elite Foundation.
5. “Investigation of the synchronic effect of synaptic delay and oscillation frequency heterogeneity on neuronal symmetry”, Researcher: Ehsan Bolhasani, Supervisor: Prof. Yousef Sabouti and Dr. Alireza Valizadeh, Start Date: 2015/09/23, Date of Completion: October 2016, Admission of postdoctoral researcher Allameh Tabatabai Award of the National Elite Foundation.
6. “Criticality hypothesis and its relation to memory in the brain”, Researcher: Amin Mousavi, Supervisor: Prof. Yousef Sabouti and Dr. Alireza Valizadeh, Start Date: 2015/09/23, Date of Completion: May 2017, Admission of postdoctoral researcher Allameh Tabatabai Award of the National Elite Foundation.
7. “Investigation of Doppler effect and linear profiles with one-dimensional hydrodynamic model of rings (P-H) in Transition area (Moss area)”, Researcher: Edris Tajfiroozeh, Supervisor: Prof. Yousef Sabouti, Start Date: February 2017, Date of Completion: February 2019, Admission of postdoctoral researcher of Iran National Science Foundation.
8. “Investigation of Doppler effect and linear profiles with one-dimensional hydrodynamic model of rings (P-H) in Transition area (Moss area)”, Researcher: Hamed Ghasemi, Supervisor: Prof. Yousef Sabouti, Start Date: June 2017, (In progress), Admission of postdoctoral researcher of the National Elite Foundation.

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

1. Scientific Committee Member of ICRANet-ISFAHAN Astronomy Meeting, November 2021
2. The Second ICRA Network Workshop, The Chaotic Universe, Pescara, Rome, Italy, February 1999
3. Adjunct Professor, International Center for Relativistic Astrophysics Network (ICRANet), Pescara, Italy, 2015

III b. Outside ICRANet

1. IAU 13th General assembly, Prague, 1967
2. IAU Sym. on planetary nebulae, Czechoslovakia, August 1967
3. IAU 14th General Assembly, Brighton, 1972
4. Black hole astrophysics, Les Houches, August 1972
5. Summer Session on Theory Astrophysics, Trieste, August 1973
6. AAS 141st Meeting, Tuscan, December 1973
7. AAS 143rd Meeting, Rochester, August 1974
8. International School of Physics (E. Fermi), Isolated gravitating systems in General Relativity, Varenna, July 1976
9. IAU Colloquium 38, Stellar Convection, Nice, France, August 1976
10. AAS 150th Meeting, Atlanta, June 1977
11. IAU Symposium 76, Planetary Nebulae, Cornell, June 1977
12. Conference on current problems in stellar pulsation instabilities, Baltimore, June 1978
13. IAU 17th General Assembly, Montreal, August 1979
14. Third Marcel Grossmann Meeting, Shanghai, 1981 (and member of International Advisory Committee)
15. AAS 164th Meeting, Tucson, January 1985
16. IAU Symposium 123, Helio- and astro-seismology, Aarhus, Denmark, July 1986

17. IAU Symposium 126, Globular systems in galaxies, Harvard, Cambridge, August 1986
18. Guest scientist, International Center for Theoretical Physics, Trieste, Summer 1986
19. Aspen Center for Physics, Workshop on Galaxies, June 1987
20. Second Regional Conference on Mathematical Physics, Adana, Turkey, 1987
21. Visiting Fellow, International Center for Theoretical Physics, Trieste, Summer 1988
22. IAU 20th General Assembly, Johns Hopkins University, August 1988
23. Visiting fellow, International Center for Theoretical Physics, Trieste, Summer 1989
24. Fourth Regional Conference on Mathematical Physics, Tehran, Iran 1990
25. Colloquium 132, International Astronomical Union, Problems of stability and instability in stellar system, Delhi October 1990
26. Wigner symposium, Gosslar, Germany, July 1991
27. Third World Academy of Science, General Assembly, Kuwait, October 1992
28. 6th Asian Pacific Regional Meeting of the IAU, Pune, India, August 1993
29. Frontiers in Theoretical Physics, Edirne, Turkey, December 1993
30. IAU 22nd General Assembly, The Hague, August 1994
31. VII International Conference on Symmetry Methods in Physics, Dubna, Russia, 1995
32. Third World Academy of Science, 5th General Assembly, Abuja, Nigeria, September 1995
33. The 7th Asian-Pacific Regional of IAU Meeting, Pusan, Korea, August 1996
34. Inter University Centre for Astronomy & Astrophysics (IUCAA), Pune, India, August 1997
35. 23rd General Assembly Meeting, IAU, Kyoto, Japan, August 1997
36. 6th General Assembly of The Third World Academy of Sciences (TWAS) and the Third Network of Scientific Organizations (TWNSO), Rio de Janeiro, Brazil, September 1997
37. The Third World Academy of Sciences (TWAS), Trieste, Italy, November 1997

38. 10th General Meeting, The Third World Academy of Sciences (TWAS), Trieste, Italy, December 1998
39. 7th General Assembly, The Third World Academy of Sciences (TWAS), Dakar, Senegal, November 1999
40. International Colloquium on Group Theoretical Methods in Physics, Dubna, Russia, August 2000
41. Stellar Dynamics from Classic to Modern, San Petersburg, Russia, August 2000
42. 12th General Meeting, Third World Academy of Sciences, Tehran, October 2000
43. Canadian Astronomical Society, Annual Meeting, McMaster University, Hamilton, May 2001
44. 8th General Assembly The Third World Academy of Sciences (TWAS), New Delhi, India, October 2001
45. Potsdam University, Invited lecturer, Potsdam, Germany, March 2002
46. IAU 8th Asian-Pacific Regional Meeting, Tokyo, Japan, July 2002
47. 25th General Assembly Meeting, IAU, Sydney, Australia, July 2003
48. 9th General Assembly The Third World Academy of Sciences (TWAS), Beijing, China, October 2003
49. 15th General Meeting, Third World Academy of Sciences, Trieste, Italy, October 2004
50. National Academy of Science of Armenia and Byurakan Astrophysical Observatory, Invited Lecturer, Yerevan, Armenia, March 2004
51. IAU 9th Asian-Pacific Regional Meeting, Bali, Indonesia, July 2005
52. 16th General Meeting, Third World Academy of Sciences, Alexandria, Egypt, December 2005
53. Inter-Academy Workshop on Science & Technology and the Future Development of Societies, Invited lecturer and head of the Iranian Delegation, Nice, France, June 2006
54. 11th Marcel Grossmann Meeting, Berlin, Germany, July 2006

IV. Other

HONORS

- Recipient of Medallion for Excellence in Research, Government of Iran, 1978
- Fellow of The Third World Academy of Sciences, elected 1987
- Fellow of The Academy of Sciences of Iran, elected 1990
- Award of the Book of the Year of the Islamic Republic of Iran, 1995
- TWAS 2000 Medal Lecturer in Physical Sciences, Tehran, October 2000
- Khwarazmi Award, 2001
- The Lasting Face in Science, Tehran, October 2001
- Iranian Physics Association celebration, Called the annual physics conference in 2002 as Sobouti's conference, 2002
- Afzalipour Award, for Outstanding Research in Physics, 2005
- Islamic Development Bank, Prize in Science and Technology for Institute for Advanced Studies in Basic Sciences – Zanjan under the directorship of Prof Yousef Sobouti, 2006
- Chair of Research in Physics, Fund for Research Support in Iran, 2007
- Exemplary Professor, “Ministry of Science, Research and Technology”, 2008
- TWAS Regional Office Prize for Scientific Institution Building in Central and south Asian Region, Bangalore, 2012
- Allamah Tabtabaee Prize, as Distinguished Scientist, Tehran, 2013
- Selected scientist of the Academy of Sciences, and proposed to the President to receive the 1st degree scientific award, 2013
- First Rank Special Award, and honoured for “Lasting Role in the Development of Education and Research”, 34th Khwarizmi International Award, 2021
- Medal of excellence of the Iranian National Commission for UNESCO, (“In the Shade of the Sun” medal), 2021
- 1st Prof. Gharib's Award on Basic Sciences, Iranian Association for Ethics in Science and Technology, 2022

Non science publications

- Trends in Basic Sciences in Contemporary Iran: Growth and Structure of Mainstream Basic Sciences", (with Sh. Etemad) In Science and Technology and the Future Development of Societies, Editor: Glenn Schweitzer, National Research Council of the National Academies, the National Academies Press, Washington, D. C., 24-30, 2008.
- The Morality of Exact Sciences, In Science and Technology and the Future Development of Societies, Editor: Glenn Schweitzer, National Research Council of the National Academies, the National Academies Press, Washington, D. C., 10-13, 2008.
- Understanding others the science way, Proceedings of the Workshop on " Science the Gateway to Understanding, Tehran, October 2008", Editors: Glenn Schwitzer and Yousef Sobouti, The National Academies Press, Washington, D.C., 2008.
- Review of Cosmic Anger: Abdus Salam — the First Muslim Nobel Scientist, the Mathematical Association of America, Online, 2008.

2021 List of Publication

Sobouti, Y., “Three arguable and interrelated concepts: point particle singularity, asymmetric action of EM on quantum wave functions, and the Left out restricted Lorentz gauge from $U(1)$ ”, arXiv:1507.06393v2 [physics.class-ph], (2022).

Zen Vasconcellos, César Augusto



Position: Full Professor (Universidade Federal do Rio Grande do Sul (UFRGS), Adjoint professor (ICRANet)
Period covered: 2021

I Scientific Work

Research on cosmology and nuclear astrophysics

II Conferences and educational activities

II a Conferences and Other External Scientific Work

a) XXI Meeting of Physics 2021

16-18 December 2021, Cusco. Peru

Member of the International Organizing Committee and the International Organizing Committee

b) Sixteenth Marcel Grossmann Meeting - MG16 Virtual Meeting - July 5-10, 2021

Member of the International Coordinating Committee

c) Sixteenth Marcel Grossmann Meeting - MG16 Virtual Meeting - July 5-10, 2021

Chair of the Parallel Session: Compact Stars as Laboratories for Testing Strong Gravity

II b Work With Students

II c Diploma thesis supervision: Advisor of the following students: 1) Fábio Köpp Nóbrega, 2) Vinicius Medeiros

Gomes da Silveira e 3) João Vitor Batista Vanazzi 4) Benno Bodmann.

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2021 List of Publication

1.

- SILVEIRA, V. M. G. ; VASCONCELLOS, C. A. Z. ; LUNA, E. G. S. ; HADJIMICHEF, D. . Matterantimatter asymmetry and non-inertial effects. JOURNAL OF HIGH ENERGY PHYSICS , v. 2021, p. 285, 2021.
2.
SILVEIRA, VINICIUS M. G. ; VASCONCELLOS, C. A. Z. ; LUNA, EMERSON G. S. ; HADJIMICHEF, D. . Noninertial effects on CP -violating systems. ASTRONOMISCHE NACHRICHTEN , v. 342, p. 352-356, 2021.
3.
RAZEIRA, MOISÉS ; KÖPP, FABIO ; VOLKMER, GUILHERME ; MACHADO, MAGNO ; HADJIMICHEF, DIMITER ; ZEN VASCONCELLOS, CÉSAR A. . Equation of state of strange stars with admissible dark matter: Derivation from galactic rotational curves. ASTRONOMISCHE NACHRICHTEN , v. 342, p. 310-314, 2021.
Citações: 1
4.
GAMARRA, MILTON ROJAS ; GULLBERG, STEVEN R. ; ESTRÁZULAS, MÓNICA ; HORVATH, JORGE ; ZEN VASCONCELLOS, CÉSAR A. . Inka's cosmovision, space, time, and Cosmos: A Western perspective. ASTRONOMISCHE NACHRICHTEN , v. 342, p. 31-38, 2021.
5.
ZEN VASCONCELLOS, CÉSAR A.; HESS, PETER O. ; HADJIMICHEF, DIMITER ; BODMANN, BENNO ; RAZEIRA, MOISÉS ; VOLKMER, GUILHERME L. . Pushing the limits of time beyond the Big Bang singularity: Scenarios for the branch cut universe. ASTRONOMISCHE NACHRICHTEN , v. 1, p. asna.202113993, 2021.
6.
ZEN VASCONCELLOS, CÉSAR A.; HESS, PETER O. ; HADJIMICHEF, DIMITER ; BODMANN, BENNO ; RAZEIRA, MOISÉS ; VOLKMER, GUILHERME L. . Pushing the limits of time beyond the Big Bang singularity: The branch cut universe. ASTRONOMISCHE NACHRICHTEN , v. 1, p. asna.202113992, 2021.
7.
ZEN VASCONCELLOS, CÉSAR A.; HESS, PETER O. ; PICCINELLI, GABRIELLA ; MAGAÑA, MARIANA VARGAS ; UREÑA'LOPEZ, LUIS ; FELIPE, RICARDO GONZALEZ ; BOLLER, THOMAS ; GULLBERG, STEVEN . Special volume - 9th International Workshop on Astronomy and Relativistic Astrophysics: From Quarks to Cosmos. ASTRONOMISCHE NACHRICHTEN , v. 1, p. asna.202113986, 2021. Editors.

Lecturers

Bini Donato



Position: Current

Research Director (permanent position) at
Istituto per le Applicazioni del Calcolo “M. Picone,” CNR
Via dei Taurini, 19 I-00185 Roma (IT).

I Scientific Work

The main topic of my interest is General Relativity, with special attention to classical aspects.

In particular, I'm interested in: analysis and interpretation of exact solutions of Einstein's field equations, spacetime splitting techniques, measurement process and the role of the observer in General Relativity, particle dynamics in certain fixed gravitational backgrounds (either test particles with scalar structure: the mass, or particles with internal structure: spinning test particles and particles with multipolar structure, quadrupolar and beyond), gravitational perturbations, gravitational waves. Currently, the main topics of interest for my research activities involve the PN approximation of General Relativity, gravitational self-force, effective-one-body model, with applications to binary systems.

I'm an expert user of MAPLETM tensor calculus package.

II Conferences and educational activities

Conferences and Other External Scientific Work

Since 1988 I have participated in all the international meetings of the Marcel Grossmann series as well as all the conferences of the ICRA- ICRANet series.

From 2016 I'm attending the Capra Meetings of the gravitational self-force community and as well as all meeting involving Post-Newtonian approximation, Post-Minkowskian approximation, Effective Field Theory and Effective One-Body approach.

Diploma thesis supervision

I've been supervisor of the Diploma thesis of several students at the University of Rome "La Sapienza", since 1995:

G. Spoliti, A. Merloni, C. Germani, C. Cherubini, G. Miniutti, G. Cruciani, A. Geralico, A. Lunari, M. De Mattia, D. Gregoris.

Ph.D thesis supervision

Dr. V. Montaquila, Physics departments of the University of Naples "Federico II.," year 2011.

Dr. M. Haney, IRAP Ph.D, University of Rome "Sapienza," year 2013.

Gabriel G. Carvalho (CAPES, Brazil and ICRANet), year 2016.

Teaching experiences

I'm Contract Professor of Physics since 2004 at the faculty of Medicine of the University Campus Biomedico, in Rome. From 2007-2009 I have also been Contract Professor of Physics at the Nursery School of the same university. I've been teaching monographic courses at various Ph.D. schools in Italy.

Work with associate researchers

A Geralico (Istituto per le Applicazioni del Calcolo "M. Picone," CNR, Rome, Italy)

III Service activities

Scientific collaboration with:

Prof. R.T. Jantzen (Villanova University, USA and ICRANet);

Outside ICRANet

Scientific collaboration with:

Prof. T. Damour (IHES, Paris, France).

Other

For the years 2002-2004 I have been the leader of a collaboration project between the Italian Research Council (CNR) and the analogous institution in Venezuela. Title of the project: *Construction of 3d numerical models for the study of magnetohydrodynamics in gravitational physics and astrophysics.*

For the years 2007-2008 I have been the leader of young researchers projects of INDAM (Istituto Nazionale di Alta Matematica). Title of the project: *Light coordinates and spacetime topography.*

For the years 2008-2009 I have been the leader of young researchers projects of INDAM (Istituto Nazionale di Alta Matematica). Title of the project: *Sistemi di Posizionamento Globale relativistici*

I'm currently doing referee activity for a large number of international journals in the field of General Relativity and I'm a reviewer for Mathreview.

For the years 2017, 2018 and 2019 I've been awarded as **Outstanding Referee** from the journal Classical and Quantum Gravity (IOP).

In the year 2021 I've been awarded as **Outstanding Referee** from the American Physical Society.

2021 List of publications

9) Salucci P, et al.,

Einstein, Planck and Vera Rubin: Relevant Encounters Between the Cosmological and the Quantum Worlds,

Frontiers in Astronomy and Space Sciences,

8:603190, 2021

doi: 10.3389/fphy.2020.603190

White Paper of the INFN collaboration QGSKY

e-print: arXiv:2011.09278

10) Bini D., Damour T., Geralico A., Laporta S. and Mastrolia P.

Gravitational scattering at the seventh order in G : nonlocal contribution at the sixth post-Newtonian accuracy,

Phys. Rev. D, **103**, No. 4, 044038 (2021)

e-print: [arXiv:2012.12918 [gr-qc]].

DOI: 10.1103/PhysRevD.103.044038

11) Bini D., Esposito G.,

Investigating new forms of gravity-matter couplings in the gravitational field equations

Phys. Rev. D, **103**, 064030 (2021)

e-print: [arXiv:2101.09771 [gr-qc]]

DOI: 10.1103/PhysRevD.103.064030

12) Bini D., Damour T., Geralico A.

Radiative contributions to gravitational scattering,

Phys. Rev. D **104**, no.8, 084031 (2021)

doi:10.1103/PhysRevD.104.084031

e-print: [arXiv:2107.08896 [gr-qc]].

13) Bini D., Geralico A.

Frequency domain analysis of the gravitational wave energy loss in hyperbolic encounters

Phys. Rev. D, **104**, 104019 (2021)

doi:10.1103/PhysRevD.104.104019
e-print: [arXiv:2108.02472 [gr-qc]].

14)Bini D., Geralico A.

Higher-order tail contributions to the energy and angular momentum fluxes in a two-body scattering process

Phys. Rev. D, **104**, 104020 (2021)
doi:10.1103/PhysRevD.104.104020
e-print: [arXiv:2108.05445 [gr-qc]].

Submitted papers

15)Bini D., Geralico A., R. T. Jantzen

Strengthening the notion of Petrov type I spacetimes

General Relativity and Gravitation, submitted 2021
e-Print: [arXiv:2111.01283 [gr-qc]]

16)Bini D., Mashhoon B., Obukhov Y. N.

Gravitomagnetic Helicity

Phys. Rev. D, submitted (2021)
e-print: [arXiv:2112.07550 [gr-qc]].

Cherubini Christian



Position: Associate Professor in Mathematical Physics (MAT/07).
Department of Science and Technology for Humans and the Environment
Laboratory of Nonlinear Physics and Mathematical Modeling
University “Campus Bio-Medico di Roma”,
Via A. del Portillo 21, I-00128 Rome, Italy
and
Adjunct Professor in ICRANet Faculty.

Period covered: position at ICRANet started on September 11th, 2017

I Scientific Work

- Electrodynamics and magnetohydrodynamics around black holes;
- Selfgravitating systems;
- Mathematical Biology.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Co-chairman of the parallel session on "Binary-Driven Hypernovae of type 1, 2 and 3" at the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).
- Talk with title “On Kerr black hole perfect MHD processes in Doran coordinates" in track "Strong Electromagnetic and Gravitational Field Physics: From Laboratories to Early Universe” of the Sixteenth Marcel Grossmann Meeting on General Relativity (MG16).

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

In 2021 Prof. Cherubini has collaborated with Dr Moradi, Dr Rueda and several other ICRANet scientists on problems of electrodynamics around black holes and on self gravitating systems.

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

- Participation to the "Collegio di Dottorato" of the INTERNATIONAL RELATIVISTIC ASTROPHYSICS PH.D."

III b. Outside ICRANet

- Lecturer "Electromagnetism" (Departmental Faculty of Engineering, University Campus Bio-Medico of Rome).
- Lecturer "Mathematical Physics Models for Engineering" (Departmental Faculty of Engineering, University Campus Bio-Medico of Rome).
- Supplementary teaching for "Rational Mechanics Laboratory" (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).
- Lecturer "Mathematics" in the integrated course of Mathematics and Computer Science (Department of Science and Technology for Humans and the Environment, University Campus Bio-Medico of Rome).

IV. Other

Prof. Cherubini has a longstanding collaboration with other ICRANET scientists. In particular, in collaboration with Dr D. Bini, Prof. R. T Jantzen, Prof. R. Ruffini and Dr. J.A. Rueda, he has written several articles in various aspects of classical General Relativity. With Prof. S. Filippi he is involved in research activities in the fields of Stellar and Galactic self-gravitating Structures, Analogue models of Gravitation and Complex Systems in biophysics.

2021 List of Publications

- R. Moradi, J. A. Rueda, R. Ruffini, Liang Li, C. L. Bianco, S. Campion, C. Cherubini, S. Filippi,, Y. Wang, and S. S. Xue, "Nature of the ultrarelativistic prompt emission phase of GRB 190114C", PHYSICAL REVIEW D 104, 063043 (2021).
- A. Loppini, A. Barone, A. Gizzi, C. Cherubini, F. H. Fenton, S. Filippi, "Thermal effects on cardiac alternans onset and development: A spatiotemporal correlation analysis", PHYSICAL REVIEW E 103, L040201 (2021)
- R. Ruffini, R. Moradi, J. A. Rueda , L. Li, N. Sahakyan, Y.-C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B.

Pisani, and S. S. Xue, "The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs", MNRAS 504, 5301–5326 (2021).

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Sang Pyo Kim



Position: Professor, Kunsan National University, Visiting professor at Institute of Theoretical Physics, CAS, China
Period covered: 2021.01.01-2021.12.31

I Scientific Work

- (i) Studied Hawking radiation as well as Schwinger effect in (near-)extremal KN-(A)dS black holes
- (ii) Explored the QED vacuum polarization effect in supercritical magnetic fields and applied to astrophysics, such as magnetars
- (iii) Investigated in the phase-integral formulation pair production in a constant electric field assisted by an oscillating electric field.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

*Organized the 17th Italian-Korean Symposium on Relativistic Astrophysics
Kusan National University, CQeST-Sogang University, ICRANet
August 2 (Mon)-6(Fri), 2021

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

- (i) AAPPS-DACG Workshop on Astrophysics, Cosmology and Gravitation at APCTP, October 4(Mon)-8 (Fri), 2021, IOC chair

IV. Other

- (i) 2021.1-2023.12: Chair, DACG (Division of Astrophysics, Cosmology and Gravitation), AAPPS (Association of Asia Pacific Physics Societies)
- (ii) 2020.1-2022.12: President, APCosPA Org (Asia Pacific Cosmology and Particle Astrophysics Organization)

2021 List of Publication

- (i) C. M. Kim and S. P. Kim, “Magnetars as Laboratories for Strong Field QED,” e-Print: [2112.02460](#)
- (ii) C-M. Chen and S. P. Kim, “Dyon Production from Near-Extremal Kerr-Newman-(Anti-)de Sitter Black Holes, “ e-Print: [2111.14124](#) [hep-th]
- (iii) J. Zhang, Y-Y. Lin, H-C. Liang, K-J. Chi, C-M. Chen, S. P. Kim and J-R. Sun, “Pair production in Reissner-Nordström-Anti de Sitter black holes,” Chin. Phys. C 45 (2021) 6, 065105
- (iv) L. Liu, Ø. Christiansen, W-H. Huang, Z-K Guo, R-G. Cai and S. P. Kim, “Gravitational and electromagnetic radiation from binary black holes with electric and magnetic charges: elliptical orbits on a cone,” Eur. Phys. J. C 81 (2021) 11, 1048
- (v) C. M. Kim, A. Fedotov and S. P. Kim, “Phase-Integral Formulation of Dynamically Assisted Schwinger Pair Production,” e-Print: [2109.10268](#) [hep-ph]

Research Scientists

Visiting Scientists

Bobomurat AHMEDOV

Position:

Member of The World Academy of Sciences (TWAS)
Fellow of Islamic World Academy of Sciences (FIAS)
Full Professor in Astrophysics and Theoretical Physics
HEAD, THEORETICAL ASTROPHYSICS DEPARTMENT
Ulugh Beg Astronomical Institute
Uzbekistan Academy of Sciences
Astronomy St. 33, Tashkent 100052
UZBEKISTAN



I Scientific Work

My present employment and duties:

Bobomurat Ahmedov is currently Full Professor of the National University of Uzbekistan (NUUz), Tashkent and Head of Theoretical Astrophysics Department, Ulugh Beg Astronomical Institute (AI), Tashkent. Bobomurat Ahmedov is awarded with the Highest Scientific Title "Honorary Researcher of Uzbekistan" in 2021. He has been elected as Member of The World Academy of Sciences (TWAS), Trieste, Italy in 2018. Fellow of Islamic Academy of Sciences (FIAS), elected on 01/12/2020. He received the PhD degree from the Uzbekistan Academy of Sciences in 1993 and the highest DrSc habilitation degree from NUUz in 2001. He is member of the Expert Group of the Supreme Attestation Committee of the Republic of Uzbekistan and of Scientific and Technical Council in Physics & Mathematics of the Uzbekistan Ministry of Innovative Development. He has published more than 150 research papers in high impact factor refereed journals, he has over 4,600 citations and his current h-index is 39. He has published 3 books as author/co-author and two issues of the journal by the Springer as co-editor. He has received a number of awards, including "The Researcher of the Year 2018" in Uzbekistan, awarded by Scopus database on 23/11/2018, "Science Leader" Web of Science award – 2017, selection by the Clarivate Analytics Web of Science as the "Highly Cited Author" in the country (Uzbekistan) with 77 papers published in the refereed journals during the last 10 years; Uzbekistan State Order "Glory of Labor", 2012 (Mehnat Shuhrati ordeni/Orden Trudovoj Slavy); Award of The World Academy of Sciences for Young Scientists in Physics in Year 2001; Award of Uzbekistan Academy of Sciences for Young Scientists in Physics in Year 1996; International Science Foundation (ISF) Award, 1994.

Main duty of Ahmedov is to carry out the theoretical research in the field of relativistic astrophysics, general relativity, gravitation and in addition, observational research on GPS and VLF data analysis for ionospheric disturbances caused by various atmospheric, terrestrial and extraterrestrial phenomena. His research is mainly devoted to the optical and energetic properties of black holes, the general-relativistic electrodynamics of continuous media and its application for theoretical explanation and analysis of EM (electromagnetic) and astrophysical processes in the external gravitational fields, Particles and Fields in the vicinity of Black Holes. Experimental tests of general relativity, general relativistic EM effects and fields for pulsars and magnetized rotating and oscillating neutron stars are also in the scope of his scientific interests. In addition he is doing a research on VLF (very low frequency) EM wave propagation in Earth ionosphere and study of the ionospheric disturbances in D

and F layers of the ionosphere caused by various atmospheric, terrestrial and extraterrestrial phenomena.

II Conferences and educational activities

II a. Conferences and Other External Scientific Works

SEMINARS, SUMMER SCHOOLS AND CONFERENCES attended in year 2021

1. **Plenary talk** " Astrophysical Observable Properties of Black Holes and Neutron Stars" by **B. Ahmedov** at 6th Maidanak Users Meeting in Ulugh Beg Astronomical Institute, Uzbekistan during 1 - 3 November 2021.
2. **Plenary talk** " On Observational Properties of Gravitational Compact Objects" by **Bobomurat Ahmedov** at 4th PU International Conference on Gravitation and Cosmology, November 22-25, 2021, University of the Punjab, Lahore-Pakistan
3. **Plenary talk** "Development and Perspectives of Relativistic Astrophysics in Uzbekistan" by **B. Ahmedov** at conference **IWRAG-2021** in Ulugh Beg Astronomical Institute, Uzbekistan during 12 - 14 May 2021.
4. **Invited talk** by **B. Ahmedov** on 10 June 2021, Tashkent at the 1st International Conference on Problems and Perspectives of Modern Science ICPPMS-2021, "Relativistic Astrophysics of Gravitational Compact Objects".
5. **Invited talk** by **B. Ahmedov** " Relativistic Astrophysics of Black Holes and Neutron Stars", Ташкент, RIAK-XIV-2021, 09.04.2021.
6. **Invited talk** "Galaxies-MDPI: Particles and Fields in Black Hole Environment" by **B. Ahmedov** at the Exhibitor Webinar, 237th AAS Meeting, USA, 12.01.2021.
7. **Invited talk** "Stars, types of stars and their evolution in the Universe" by **B. AHMEDOV**, Tashkent, high school Algorithm, 16.04.2021.
8. **Invited talk** "Accelerated expansion of the Universe - dark matter and dark energy", **B. AHMEDOV**, Tashkent, NUUz, WEBINAR, 10.04.2021.
9. **Plenary talk** "Accelerated expansion of the Universe - dark matter and dark energy", **B. AHMEDOV**, Tashkent, Ulugh Beg Astronomical Institute, 18.03.2021.
10. **Invited talk**, Prof. Bobomurat Ahmedov, Academy of Sciences of Uzbekistan, UNESCO ICTP (International Center for Theoretical Physics) Network Coordinator "Important role of academic mobility and international cooperation in the development of fundamental sciences", Higher education and science: online meeting on critical analysis and political approach, Tashkent, June 21, 2021.
11. **Chairman** of LOC of international online workshop on Relativistic Astrophysics and Gravitation, **IWRAG-2021** in Ulugh Beg Astronomical Institute, Uzbekistan during 12 - 14 May 2021.
12. **Member** of the MG16 (The Sixteenth Marcel Grossmann Meeting on Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories) International Coordinating Committee, July 5-10, **2021**.

II b. Work With PhD Students

Dr Ozodbek Rahimov, PhD student, Particle Motion and Electromagnetic Fields around Axial Symmetric Gravitating Objects, **(Ph.D. degree defended in May 2021)**

Dr Abdullo Hakimov, PhD student, Relativistic Astrophysical Processes in Axial Symmetric Alternative Gravitational Models, **(Ph.D. degree defended in October 2021)**

Husan Eshkuvatov, PhD student, Electromagnetic Studies of Ionospheric and Magnetospheric Perturbations Associated with the Earth, Atmospheric and Astrophysical Phenomena **(Ph.D. degree is expected in 2022)**

Pulat Tajimuratov, PhD student, Thermal Evolution and Optical Signatures of Neutron Stars **(Ph.D. degree is expected in 2022)**

Yunusbek Turayev, PhD student, Modeling the dynamics of the structure of the upper layers of variable stars based on observational data (enrolled at present)

II c. Diploma thesis supervision

Sirojiddin Toshpulatov, graduate student (M.Sc. degree is defended in June 2021)

* **Temurbek Mirzaev** (M.Sc. expected in June 2022)

* **Mirzabek Alloqulov** (M.Sc. expected in June 2022)

* **Furqat Sariqulov** (M.Sc. expected in June 2022)

II d. Other Teaching Duties

Spring term 2021: Course in Nuclear Astrophysics (80 lecture hours) for the 1st year graduate students (Master Course), Chair of Nuclear Physics, Faculty of Physics, National University of Uzbekistan, Tashkent, Uzbekistan.

Fall term 2021: Course in Methods of Mathematical Physics, (80 lecture hours) for the 3rd year undergraduate students (Bachelor Course), Chair of Theoretical Physics, Faculty of Physics, National University of Uzbekistan, Tashkent, Uzbekistan.

Fall term 2021: Course in Gravitational Field Theory (80 lecture hours) for the 2nd year graduate students (Master Course), Chair of Theoretical Physics, Faculty of Physics, National University of Uzbekistan, Tashkent, Uzbekistan.

II e. Work With Postdocs

Dr Javlon Rayimbaev, Energetic properties of rotating neutron stars and particle dynamics around black holes **(holds Ph.D. degree from 2020)**

Dr Ozodbek Rahimov, Optical and Energetic processes in vicinity of relativistic compact objects **(holds Ph.D. degree from 2021)**

Dr Sanjar Shaymatov, General relativistic astrophysical processes in the vicinity of compact gravitational objects in the presence of an electromagnetic field, **(holds Ph.D. degree from 2018)**

Dr Bobir Toshmatov, Dynamics of scalar, electromagnetic, gravitational perturbations and particles around relativistic astrophysical objects (**holds Ph.D. degree from 2018**)

Dr Shukhrat Mardonov, Bose-Einstein condensate: physical, cosmological and astrophysical applications (**holds Ph.D. degree from 2017**)

III Service activities

Within ICRANet

Outside ICRANet

Details of projects leaded in year 2021

Leader of 5 Years **Fundamental** Research Project Grant **F-FA-2021-432** "*Analysis and processing of satellite data of low-mass X-ray binary systems*" from the Uzbekistan Ministry of Innovational Development, Tashkent, Uzbekistan (**1 October 2021 - 30 September 2026**).

Leader of 2 Years **Uzbekistan-Belorussian** Research Project **MRB –AN – 2019 – 29** "*Modelling of compact astrophysical objects and correlation of their observational characteristics with parameters of the telescope RT-70 and Russian orbital telescope Gamma-400*" from the Uzbekistan Ministry of Innovational Development, Tashkent, Uzbekistan (**1 May 2019 - 30 April 2021**).

Consultant of Project B191039 "Gravitational, Scalar, Electromagnetic Fields and Particle Motion Around Compact Objects" from King Fahd University of Petroleum and Minerals, Saudi Arabia (**01 April 2020 – 30 September 2021**).

IV Other

Coordinator, The AS-ICTP India-Kazakhstan-Thailand-Uzbekistan Network (IKTUN, NT-01) on Theoretical Astrophysics, Gravitation and Cosmology.

2021 List of Publications

1. Bakhtiyor Narzilloev, Javlon Rayimbaev, Ahmadjon Abdujabbarov, **Bobomurat Ahmedov**, Cosimo Bambi1, Dynamics of charged particles and magnetic dipoles around magnetized quasi-Schwarzschild black holes, **European Physical Journal C**, Vol. 81, id 269 (2021), <https://doi.org/10.1140/epjc/s10052-021-09074-z> (**IF: 4.770**).
2. Javlon Rayimbaev, Alexandra Demyanova, Ugur Camci, Ahmadjon Abdujabbarov and **Bobomurat Ahmedov**, Dynamics of charged and magnetized particles around cylindrical black holes immersed in external magnetic field, **International Journal of Modern Physics D**, Vol. 30, id. 2150019 (2021), DOI: 10.1142/S021827182150019X (**IF: 2.154**).
3. Nozima Juraeva, Javlon Rayimbaev, Ahmadjon Abdujabbarov, **Bobomurat Ahmedov**, Satimbay Palvanov, Distinguishing magnetically and electrically charged Reissner–Nordström black holes by magnetized particle motion, **European Physical Journal C**, Vol. 81, id 70 (2021), <https://doi.org/10.1140/epjc/s10052-021-08876-5> (**IF: 4.770**).
4. Bobir Toshmatov, **Bobomurat Ahmedov**, and Daniele Malafarina, Can a light ray distinguish the charge of a black hole in nonlinear electrodynamics?, **Physical Review D**, Vol. 103, 024026 (2021), [https:// DOI: 10.1103/PhysRevD.103.024026](https://doi.org/10.1103/PhysRevD.103.024026) (**IF: 4.394**).

5. Bobur Turimov, Ozodbek Rahimov, **Bobomurat Ahmedov**, Zdenek Stuchlik, Kholida Boymurodova, Dynamical motion of matter around a charged black hole, **International Journal of Modern Physics D**, Vol. 30, (2021) <https://doi.org/10.1142/S0218271821500371> (IF: 2.154).
6. Sanjar Shaymatov, **Bobomurat Ahmedov**, Mubasher Jamil, Testing the weak cosmic censorship conjecture for a Reissner–Nordström–de Sitter black hole surrounded by perfect fluid dark matter, **European Physical Journal C**, 2021, 81:588 (Impact Factor: 4.843)
7. Farruh Atamurotov, Sanjar Shaymatov and **Bobomurat Ahmedov**, Particle Motion and Plasma Effects on Gravitational Weak Lensing in Lorentzian Wormhole Spacetime, **Galaxies**, 2021, 9, 54. <https://doi.org/10.3390/galaxies9030054> (Impact Factor: 1.129)
8. Bobur Turimov, **Bobomurat Ahmedov** and Zdenek Stuchlik, On exact analytical solution of Einstein-Maxwell-scalar field equations, **Physics of Dark Universe**, 2021, 33, 100868, 8 pp (Impact Factor: 5.430)
9. **Bobomurat Ahmedov**, Ozodbek Rahimov, and Bobir Toshmatov, Gravitational capture cross section of particles by Schwarzschild-Tangherlini black holes, **Universe**, (2021), 307. <https://doi.org/10.3390/universe7080307> (IF: 2.278).
10. Dmitriy Ovchinnikov, Muhammad Umar Farooq, Ibrar Hussain, Ahmadjon Abdujabbarov, **Bobomurat Ahmedov** and Zdenek Stuchlik, Quasiperiodic oscillations of test particles near marginally stable circular orbits around charged Kiselev black hole, **Physical Review D**, 104, 063027 (2021) (IF: 4.394).
11. Bakhtiyor Narzilloev, Daniele Malafarina, Ahmadjon Abdujabbarov, **Bobomurat Ahmedov**, and Cosimo Bambi, Particle motion around a static axially symmetric wormhole, **Physical Review D**, (2021) 104, 064016 (IF: 4.394).
12. B. Narzilloev, J. Rayimbaev, A. Abdujabbarov, **B. Ahmedov**, Regular Bardeen Black Holes in Anti-de Sitter Spacetime versus Kerr Black Holes through Particle Dynamics. **Galaxies** 2021, 9, 63. <https://doi.org/10.3390/galaxies9030063> (IF: 1.129).
13. Turimov, B.; **Ahmedov, B.** Zipoy-Voorhees Gravitational Object as a Source of High-Energy Relativistic Particles. **Galaxies**, 2021, 9, 59. <https://doi.org/10.3390/galaxies9030059> (IF: 1.129).
14. Rayimbaev, J.; Narzilloev, B.; Abdujabbarov, A.; **Ahmedov, B.** Dynamics of Magnetized and Magnetically Charged Particles around Regular Nonminimal Magnetic Black Holes. **Galaxies**, 2021, 9, 71. <https://doi.org/10.3390/galaxies9040071> (IF: 1.129).
15. Rayimbaev, J.; Tadjimuratov, P.; Abdujabbarov, A.; **Ahmedov, B.**; Khudoyberdieva, M. Dynamics of Test Particles and Twin Peaks QPOs around Regular Black Holes in Modified Gravity. **Galaxies**, 2021, 9, 75. <https://doi.org/10.3390/galaxies9040075> (IF: 1.129).
16. Carlos A. Benavides-Gallego, Wen-Biao Han, Daniele Malafarina, **Bobomurat Ahmedov**, and Ahmadjon Abdujabbarov, Spinning test particle motion around a traversable wormhole, **Physical Review D**, 104, 084024 (2021), 17pp. (IF: 4.394).
17. Sanjar Shaymatov, Daniele Malafarina, **Bobomurat Ahmedov**, Effect of perfect fluid dark matter on particle motion around a static black hole immersed in an external magnetic field, **Physics of Dark Universe**, 2021, 34, 100891, 12 pp (Impact Factor: 5.430)
18. Ashfaque Bokhari, Javlon Rayimbaev and **Bobomurat Ahmedov**, Radio loudness and spindown of pulsars in Einstein-aether gravity, **Physics of Dark Universe**, 2021, pp (Impact Factor: 5.430)
19. Bakhtiyor Narzilloev, Ibrar Hussain, Ahmadjon Abdujabbarov, **Bobomurat Ahmedov**, Cosimo Bambi, Dynamics and fundamental frequencies of test particles orbiting Kerr–Newman–NUT–Kiselev black hole in Rastall gravity, **European Physical Journal Plus**, 2021, 136:1032 (Impact Factor: 3.228) <https://doi.org/10.1140/epjp/s13360-021-02039-x>
20. Turimov, B.; Abdujabbarov, A.; **Ahmedov, B.**; Stuchlik, Z. Generic Three-Parameter Wormhole Solution in Einstein-Scalar Field Theory. **Particles** 2022, 5, 1–11. <https://doi.org/10.3390/particles5010001> (IF: 1.129).

Monography and Special Issues edited:

1. A.A. Abdujabbarov, **B.J. Ahmedov**, A.S. Rakhmatov, Modern Status of High Energy Physics and Astrophysics, Rennsans Press, Tashkent, 2021, 148 pp, in Uzbek.

Ansoldi Stefano

Position: Researcher, permanent, full time, University of Udine
Period covered:



I Scientific Work

7. Vacuum decay with wormhole creation, and its effects in the early universe (in collaboration with Takahiro Tanaka)
8. Study of horizonless, rotating black-hole mimickers (in collaboration with Anna Zulianello, Raul Carballo-Rubio, Stefano Liberati)
9. First steps into numerical relativity simulations (performed on the HPC CINECA cluster, in a joint collaboration, at the university of Trieste, with Agata Trovato, Andrea Virtuoso, Edoardo Milotti, Enrico Fragiaco, Odysse Halim)
10. Machine learning approaches to detect quasinormal modes in gravitational waves signals
11. Maintenance of an automated Fermi data analysis and alert system for target of observations in very high energy gamma rays (MA4U, Magic Automated Analyzing And Alerting Unit)
12. Upgrade and maintenance of MPSS (MAGIC Proposal Submission System), a WEB tool for submission of observation proposals to the MAGIC telescope

II Conferences and educational activities

II c Diploma thesis supervision

Undergraduate thesis

Daniele Berti (supervisor): *Field Equations of $f(R)$ Theories of Gravity (in Italian, "Le equazioni di campo delle teorie $f(R)$ della gravità)*

Master thesis

10. Marco Cusinato (co-supervisor, in collaboration with Albino Perego): "*Quantitative Characterization of Neutrino Luminosity in Numerical Simulations of Binary Neutron Star Mergers*"
11. Cristian Gusella (supervisor): *Eddington-inspired-Born-Infeld (EiBI) Gravity*
12. Francesco Pisani (co-supervisor, in collaboration with Daniele Oriti): *Holonomy Operators in the Group Field Theory approach to Quantum Gravity*

13. Alessandro Armando Vigliano (supervisor, in collaboration with Francesco Longo): *Gamma Ray Burst Polarization Studies with AMEGO*
14. Alessandro Longo (co-supervisor, in collaboration with Miguel Zumalacarregui and Giovanni Tambalo): *Backreaction Mechanism in Cubic Galileon Cosmology*
15. Luca Belpietro (supervisor): *Implications on the PBH scenario from the second LIGO--Virgo Gravitational--Wave Transient Catalog*
16. Jacopo Salvalaggio (co-supervisor, in collaboration with Giovanni Cabass): *Robustness of mixed scalar-tensor correlators in the EFT of inflation*
17. Lucio De Simone (supervisor): *Fundamental ideas and modern developments in perturbative quantum gravity*
18. Alberto Ghedin (internal advisor, supervisor: Bruno Giacomazzo): *General Relativistic Simulations of Binary Neutron Star Mergers*

II d Other Teaching Duties

Supervisor of about 15 internships (at the undergraduate and master level) about theoretical physics, differential geometry, gravitational physics, mathematical physics

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III b. Outside ICRANet

3. General Relativity (within the joint master course between the universities of Trieste and Udine)
4. Advanced General Relativity (within the joint master course between the universities of Trieste and Udine)

IV. Other

2021 List of Publication

50. **Electromagnetic tests of horizonless rotating black hole mimickers**, Anna Zulianello, Raul Carballo-Rubio, Stefano Liberati, Stefano Ansoldi, e-Print: [2005.01837](https://arxiv.org/abs/2005.01837) [gr-qc], DOI: [10.1103/PhysRevD.103.064071](https://doi.org/10.1103/PhysRevD.103.064071), Published in: Phys.Rev.D 103 (2021) 6, 064071

51. **Neutrino emission from binary neutron star mergers: characterizing light curves and mean energies**, Marco Cusinato, Federico Maria Guercilena, Albino Perego, Domenico Logoteta, David Radice, Sebastiano Bernuzzi, Stefano Ansoldi, , e-Print: [2111.13005](#) [astro-ph.HE]
52. **Narrowband searches for continuous and long-duration transient gravitational waves from known pulsars in the LIGO-Virgo third observing run**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2112.10990](#) [gr-qc]
53. **Tests of General Relativity with GWTC-3**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2112.06861](#) [gr-qc]
54. **All-sky search for gravitational wave emission from scalar boson clouds around spinning black holes in LIGO O3 data**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.15507](#) [astro-ph.HE]
55. **Search of the Early O3 LIGO Data for Continuous Gravitational Waves from the Cassiopeia A and Vela Jr. Supernova Remnants**, LIGO Scientific and VIRGO Collaborations • R. Abbott et al., e-Print: [2111.15116](#) [gr-qc]
56. **Combined searches for dark matter in dwarf spheroidal galaxies observed with the MAGIC telescopes, including new data from Coma Berenices and Draco**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2111.15009](#) [astro-ph.HE]
57. **Searches for Gravitational Waves from Known Pulsars at Two Harmonics in the Second and Third LIGO-Virgo Observing Runs**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.13106](#) [astro-ph.HE]
58. **Multiwavelength study of the gravitationally lensed blazar QSO B0218+357 between 2016 and 2020**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2111.12926](#) [astro-ph.HE]
59. **Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift During the LIGO-Virgo Run O3b**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.03608](#) [astro-ph.HE]
60. **Constraints on the cosmic expansion history from GWTC-3**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.03604](#) [astro-ph.CO]
61. **The population of merging compact binaries inferred using gravitational waves through GWTC-3**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.03634](#) [astro-ph.HE]
62. **GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2111.03606](#) [gr-qc]
63. **All-sky, all-frequency directional search for persistent gravitational-waves from Advanced LIGO's and Advanced Virgo's first three observing runs**, LIGO Scientific and VIRGO and KAGRA Collaborations • R. Abbott et al., e-Print: [2110.09834](#) [gr-qc]
64. **Search for subsolar-mass binaries in the first half of Advanced LIGO and Virgo's third observing run**, LIGO Scientific and VIRGO and KAGRA Collaborations • [R. Abbott](#) et al., e-Print: [2109.12197](#) [astro-ph.CO]
65. **Observation of the Gamma-Ray Binary HESS J0632+057 with the H.E.S.S., MAGIC, and VERITAS Telescopes**, VERITAS and MAGIC and H.E.S.S. Collaborations • C.B. Adams et al., e-Print: [2109.11894](#) [astro-ph.HE], DOI: [10.3847/1538-4357/ac29b7](#), Published in: *Astrophys.J.* 923 (2021) 2, 241
66. **Search for continuous gravitational waves from 20 accreting millisecond X-ray pulsars in O3 LIGO data**, LIGO Scientific and VIRGO and KAGRA Collaborations • [R. Abbott](#) et al., e-Print: [2109.09255](#) [astro-ph.HE]
67. **Searching for VHE gamma-ray emission associated with IceCube neutrino alerts using FACT, H.E.S.S., MAGIC, and VERITAS**, VERITAS and MAGIC and IceCube and H.E.S.S. and FACT Collaborations • Victor A. Acciari et al., e-Print: [2109.04350](#) [astro-ph.HE], DOI: [10.22323/1.395.0960](#), Published in: *PoS ICRC2021* (2021), 960

68. **Search for Very High-energy Emission from the Millisecond Pulsar PSR J0218+4232**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2108.11373](#) [astro-ph.HE], DOI: [10.3847/1538-4357/ac20d7](#), Published in: *Astrophys.J.* 922 (2021) 2, 251
69. **Cross-calibration and combined analysis of the CTA-LST prototype and the MAGIC telescopes**, CTA LST Project and MAGIC Collaborations • Yoshiki Ohtani et al., e-Print: [2108.05140](#) [astro-ph.IM], DOI: [10.22323/1.395.0724](#), Published in: *PoS ICRC2021* (2021), 724
70. **GWTC-2.1: Deep Extended Catalog of Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run**, LIGO Scientific and VIRGO Collaborations • R. Abbott et al., e-Print: [2108.01045](#) [gr-qc]
71. **All-sky search for long-duration gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run**, KAGRA and VIRGO and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2107.13796](#) [gr-qc], DOI: [10.1103/PhysRevD.104.102001](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 10, 102001
72. **First detection of VHE gamma-ray emission from TXS \hat{A} 1515-273, study of its X-ray variability and spectral energy distribution**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2107.09413](#) [astro-ph.HE], DOI: [10.1093/mnras/stab1994](#), Published in: *Mon.Not.Roy.Astron.Soc.* 507 (2021) 1, 1528-1545
73. **All-sky search for short gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run**, KAGRA and VIRGO and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2107.03701](#) [gr-qc], DOI: [10.1103/PhysRevD.104.122004](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 12, 122004
74. **Calibration of Advanced Virgo and reconstruction of detector strain $h(t)$ during the Observing Run O3**, VIRGO Collaboration • F. Acernese et al., e-Print: [2107.03294](#) [gr-qc]
75. **All-sky search for continuous gravitational waves from isolated neutron stars in the early O3 LIGO data**, KAGRA and VIRGO and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2107.00600](#) [gr-qc], DOI: [10.1103/PhysRevD.104.082004](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 8, 082004
76. **Observation of Gravitational Waves from Two Neutron Star-Black Hole Coalescences**, LIGO Scientific and KAGRA and VIRGO Collaborations • R. Abbott et al., e-Print: [2106.15163](#) [astro-ph.HE], DOI: [10.3847/2041-8213/ac082e](#), Published in: *Astrophys.J.Lett.* 915 (2021) 1, L5, *Astrophys.J.* 915 (2021) 1, L5
77. **Investigation of the correlation patterns and the Compton dominance variability of Mrk 421 in 2017**, MAGIC and FACT Collaborations • V.A. Acciari et al., e-Print: [2106.05516](#) [astro-ph.HE], DOI: [10.1051/0004-6361/202141004](#), Published in: *Astron.Astrophys.* 655 (2021), A89, *Astron.Astrophys.* 655 (2021), A89
78. **Search for intermediate mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo**, LIGO Scientific and Virgo and KAGRA Collaborations • Rich Abbott et al., e-Print: [2105.15120](#) [astro-ph.HE]
79. **Constraints on dark photon dark matter using data from LIGO's and Virgo's third observing run**, LIGO Scientific and Virgo and KAGRA Collaborations • R. et al., e-Print: [2105.13085](#) [astro-ph.CO]
80. **Searches for Continuous Gravitational Waves from Young Supernova Remnants in the Early Third Observing Run of Advanced LIGO and Virgo**, LIGO Scientific and VIRGO and KAGRA and Virgo Collaborations • R. Abbott et al., e-Print: [2105.11641](#) [astro-ph.HE], DOI: [10.3847/1538-4357/ac17ea](#), Published in: *Astrophys.J.* 921 (2021) 1, 80
81. **Search for Lensing Signatures in the Gravitational-Wave Observations from the First Half of LIGO-Virgo's Third Observing Run**, LIGO Scientific and VIRGO Collaborations • R. Abbott et al., e-Print: [2105.06384](#) [gr-qc], DOI: [10.3847/1538-4357/ac23db](#), Published in: *Astrophys.J.* 923 (2021) 1, 14

82. **Constraints from LIGO O3 Data on Gravitational-wave Emission Due to R-modes in the Glitching Pulsar PSR J0537+6910**, LIGO Scientific and Virgo and KAGRA Collaborations • R. Abbott et al., e-Print: [2104.14417](#) [astro-ph.HE], DOI: [10.3847/1538-4357/ac0d52](#), Published in: *Astrophys.J.* 922 (2021) 1, 71
83. **Broadband Multi-wavelength Properties of M87 during the 2017 Event Horizon Telescope Campaign**, Event Horizon Telescope and Fermi-LAT and H.E.S.S. and MAGIC and VERITAS and EAVN Collaborations • J.C. Algaba et al., e-Print: [2104.06855](#) [astro-ph.HE], DOI: [10.3847/2041-8213/abef71](#), Published in: *Astrophys.J.Lett.* 911 (2021) 1, L11, *Astrophys.J.* 911 (2021) 1, L11
84. **Search for anisotropic gravitational-wave backgrounds using data from Advanced LIGO and Advanced Virgo's first three observing runs**, KAGRA and Virgo and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2103.08520](#) [gr-qc], DOI: [10.1103/PhysRevD.104.022005](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 2, 022005
85. **Constraints on Cosmic Strings Using Data from the Third Advanced LIGO-Virgo Observing Run**, LIGO Scientific and Virgo and KAGRA Collaborations • R. Abbott et al., e-Print: [2101.12248](#) [gr-qc], DOI: [10.1103/PhysRevLett.126.241102](#), Published in: *Phys.Rev.Lett.* 126 (2021) 24, 241102
86. **Upper limits on the isotropic gravitational-wave background from Advanced LIGO and Advanced Virgo's third observing run**, KAGRA and Virgo and LIGO Scientific Collaborations • R. Abbott et al., e-Print: [2101.12130](#) [gr-qc], DOI: [10.1103/PhysRevD.104.022004](#) (publication), Published in: *Phys.Rev.D* 104 (2021) 2, 022004
87. **Follow-up observations of GW170817 with the MAGIC telescopes**, MAGIC Collaboration • Om Sharan Salafia et al., DOI: [10.22323/1.395.0944](#), Published in: *PoS ICRC2021* (2021), 944
88. **Diving below the spin-down limit: Constraints on gravitational waves from the energetic young pulsar PSR J0537-6910**, LIGO Scientific and Virgo and KAGRA Collaborations • R. Abbott et al., e-Print: [2012.12926](#) [astro-ph.HE], DOI: [10.3847/2041-8213/abffcd](#), Published in: *Astrophys.J.* 913 (2021), L27
89. **All-sky search in early O3 LIGO data for continuous gravitational-wave signals from unknown neutron stars in binary systems**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2012.12128](#) [gr-qc], DOI: [10.1103/PhysRevD.103.064017](#), Published in: *Phys.Rev.D* 103 (2021) 6, 064017
90. **VHE gamma-ray detection of FSRQ QSO B1420+326 and modeling of its enhanced broadband state in 2020**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2012.11380](#) [astro-ph.HE], DOI: [10.1051/0004-6361/202039687](#), Published in: *Astron.Astrophys.* 647 (2021), A163
91. **H.E.S.S. and MAGIC observations of a sudden cessation of a very-high-energy gamma-ray flare in PKS 1510+089 in May 2016**, H.E.S.S. and MAGIC Collaborations • H. Abdalla et al., e-Print: [2012.10254](#) [astro-ph.HE], DOI: [10.1051/0004-6361/202038949](#), Published in: *Astron.Astrophys.* 648 (2021), A23
92. **MAGIC Observations of the Nearby Short Gamma-Ray Burst GRB160821B**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2012.07193](#) [astro-ph.HE], DOI: [10.3847/1538-4357/abd249](#) (publication), Published in: *Astrophys.J.* 908 (2021) 1, 90
93. **Multiwavelength variability and correlation studies of Mrk 421 during historically low X-ray and gamma-ray activity in 2015-2016**, MAGIC Collaboration • V.A. Acciari et al., e-Print: [2012.01348](#) [astro-ph.HE], DOI: [10.1093/mnras/staa3727](#), Published in: *Mon.Not.Roy.Astron.Soc.* 504 (2021) 1, 1427-1451
94. **Tests of general relativity with binary black holes from the second LIGO-Virgo gravitational-wave transient catalog**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2010.14529](#) [gr-qc], DOI: [10.1103/PhysRevD.103.122002](#), Published in: *Phys.Rev.D* 103 (2021) 12, 122002

95. **Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2010.14533](https://arxiv.org/abs/2010.14533) [astro-ph.HE], DOI: [10.3847/2041-8213/abe949](https://doi.org/10.3847/2041-8213/abe949), Published in: *Astrophys.J.Lett.* 913 (2021) 1, L7
96. **Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift During the LIGO-Virgo Run O3a**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2010.14550](https://arxiv.org/abs/2010.14550) [astro-ph.HE], DOI: [10.3847/1538-4357/abee15](https://doi.org/10.3847/1538-4357/abee15), Published in: *Astrophys.J.* 915 (2021) 2, 86
97. **GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run**, LIGO Scientific and Virgo Collaborations • R. Abbott et al., e-Print: [2010.14527](https://arxiv.org/abs/2010.14527) [gr-qc], DOI: [10.1103/PhysRevX.11.021053](https://doi.org/10.1103/PhysRevX.11.021053), Published in: *Phys.Rev.X* 11 (2021), 021053
98. **Open data from the first and second observing runs of Advanced LIGO and Advanced Virgo**, LIGO Scientific and Virgo Collaborations • Rich Abbott et al., e-Print: [1912.11716](https://arxiv.org/abs/1912.11716) [gr-qc], DOI: [10.1016/j.softx.2021.100658](https://doi.org/10.1016/j.softx.2021.100658), Published in: *SoftwareX* 13 (2021), 100658

Arkhangelskaja Irene



Position: senior lecturer,
Institute of Nuclear Physics and Engineering,
Department of Experimental Nuclear Physics and Cosmophysics,
National Research Nuclear University "MEPhI",
Moscow, Russia

Period covered: 2021

I Scientific Work

SN Ia type investigation (several peculiarities were found in Ia supernovae redshift distribution accordingly the preliminary results of the redshift distribution analysis of the Asiago Supernova and Open Supernova Catalogues data and the separated features and areas could not be explained due 2 groups of type Ia SNe explosions scenarios and dimming of flux due interaction of surrounding media but it could affect at power in dependence of distance modulus μ on redshift, and, correspondingly, the H_0 tension between various subsamples of SN1a data);

Properties of clusters of galaxies from CfA2 redshift survey investigation (the distributions on magnitude, absolute magnitude, absolute magnitude and angular velocity, etc represent two areas for 13 clusters with redshifts in the region 0.002 – 0.032 (##88, 1101, 1046, 142, 933, 1242, 1652, 107, 150, 316, 317, 961 and 977) which confirmed by attractors studying in six dimensional phase space (constructed using values of redshift, coordinates, magnitude, absolute magnitude and distance to centre) and allows conclude two alternatives: dark matter presence inside cluster in configuration similar to Zeldovich pancake or gravitational lensing on compact object or dark matter blob located between galaxy cluster and observer);

Gamma-Ray Bursts investigation (spectra, temporal profiles, models, new parameter which not required cosmological dilation R_t (the ratio of the arrival time of a maximum-energy photon to the duration of a burst) is introduced and population of long GRBs with high-energy components is inhomogeneous due preliminary results of R_t distributions analysis) on data of detectors onboard near-Earth satellites;

Gamma-emission processes in astrophysics sources;

Dark matter and dark energy presence observation possibilities in satellite experiments;

Methods of gamma-quanta and charged particles identification due detectors based on scintillators.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Two talks at The Sixteenth Marcel Grossmann Meeting on Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories (MG16) held by ICRA in virtual format from July 5 to 10, 2021:

1.# 1018 I. V. Arkhangelskaja, Preliminary results of analysis of Ia supernovae redshift distributions on data of the Asiago Supernova and Open Supernova Catalogues (<https://indico.icranet.org/event/1/contributions/953/>)

2.# 1017 I.V.Arkhangelskaja, A. M. Galper, L. N. Khanh, and D. N. Dorosheva, Preliminary results of rich galaxy clusters' spatial distribution analysis on CfA2 Redshift survey data: compact objects or dark matter presence at redshift less 0.022. (<https://indico.icranet.org/event/1/contributions/655/>)

II b Work With Students

I'm scientific advisor of D. N. Dorosheva student's research work "Rich Galaxy Clusters from CfA2 Redshift Surveys data analysis" (NRNU MEPhI)

II c Diploma thesis supervision

II d Other Teaching Duties

As senior lecturer in National Research Nuclear University "MEPhI" I read 5 courses of lectures for the students at Master's degrees:

- 1) Actual problems of micro- and cosmophysics (in Russian)*
- 2) Nuclear physics (in Russian and in English)*
- 3) Electroweak interaction (in Russian)*
- 4) Programming on C and C++(in Russian)*
- 5) Programming languages and operational systems (in Russian)*

and 2 courses for bachelors

- 1) Introduction to Nuclear physics (in Russian)*
- 2) Programming languages and operational system (in Russian)*

II e. Work With Postdocs

I'm a science advisor of PhD thesis of L. N. Khan "Investigation of high energy gamma-emission from large galaxy clusters possibly caused by dark matter presence"

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

I'm a member of International Coordinating Committee of MG16

III b. Outside ICRANet

IV. Other

2021 List of Publication

- 1) N. P. Topchiev, A. M. Galper, I. V. Arkhangelskaja et al, GAMMA-400 Gamma-Ray Observations in the GeV and TeV Energy Range, Physics of Atomic Nuclei, volume 84, pages 1053–1058 (2021)
- 2) I. V. Arkhangelskaja Preliminary Results of Analysis of Properties of Long Gamma-Ray Bursts with High-Energy Components: The Inhomogeneity of Their Source Populations, Bulletin of the Russian Academy of Sciences: Physics, volume 85, pages 461–463 (2021)

Boçi Sonila

Position: Lecture, Department of Physics, Faculty of Natural Sciences, University of Tirana
Period covered: 2021

I Scientific Work

Because of the pandemic year, during this year my main focus was on teaching, on didactic problems and on GRB physics.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision: 3 diploma thesis supervisions: in Master of Science in Physics: Teacher of Physics for high school.

II d Other Teaching Duties: Lectures, seminars and laboratories for students of Bachelor in Physics and Masters of Science in Physics: Teacher of Physics for high school.

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...]*

III a. Within ICRANet

III b. Outside ICRANet

Eslamzadeh Sareh

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Iran **Email:**

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EDUCATION

- ☐ **Ph.D.**, Gravity and Cosmology
University of Mazandaran, Babolsar, Iran (2018-Present)
Supervisor: Prof. Kourosh Nozari
Advisor: Dr. Javad Taghizadeh Firouzjaee
Proposal: Cosmological Black Holes Surrounded by A Scalar Field
Graduate course: Advanced General Relativity. Quantum Field Theory. Modern Cosmology.
- ☐ **M.Sc.**, Gravity and Cosmology
University of Mazandaran, Babolsar, Iran (2010-2012)
Supervisor: Prof. Kourosh Nozari
Advisor: Dr. Ali Bahari
Proposal: Topics in Thermodynamics of Black Holes in Noncommutative Space
Graduate course: Modern Quantum Mechanics 1,2. Statistical Mechanics. Classical Electrodynamics. General relativity 1,2.
- ☐ **B.Sc.**, Solid State Physics
Payam-e Noor University of Mashhad, Mashhad, Iran (2005-2010)

PUBLICATION

- ☐ Y. Aimuratov, L. Becerra, C. L. Bianco, Y-C. Chen, C. Cherubini, **S. Eslamzadeh**, S. Filippi, M. Karlica, L. Li, G.J. Mathews, R. Moradi, M. Muccino, G. B. Pisani, F. RastegarNia, J. A. Rueda, R. Ruffini, N. Sahakyan, Y. Wang, S. S. Xue, on behalf of the ICRANet and ICRA-USTC team, ‘GCN CIRCULAR’.
[<https://gcn.gsfc.nasa.gov/gcn3/31056.gcn3>]

- ☐ **Sareh Eslamzadeh**, Javad T. Firouzjaee, Kourosh Nozari, 'Radiation from Einstein-Gauss-Bonnet de Sitter Black Hole via Tunneling Process', Submitted in Euro. Phys. J. C, on Jul 2021. [<https://arxiv.org/abs/2107.07947>]
- ☐ **Sareh Eslamzadeh**, Kourosh Nozari, 'Tunneling of massless and massive particles from a quantum deformed Schwarzschild black hole surrounded by quintessence', Nuclear Physics B 959 (2020). [<https://doi.org/10.1016/j.nuclphysb.2020.115136>]
- ☐ Kourosh Nozari, **Sara Islamzadeh**, 'Tunneling of massive and charged particles from noncommutative Reissner-Nordström black hole', Astrophysics S. Sci. 347 (2013). [<https://arxiv.org/abs/1207.1177>]

AREAS OF INTEREST

- ☐ Tunneling Process and Hawking Radiation
- ☐ Cosmological Black Holes
- ☐ Quantum Field Theory
- ☐ Thermodynamics of Black Holes

SKILLS

- ☐ Compute language: Mathematica, Maple, and MATLAB
- ☐ Competent using software including Microsoft Office, Photoshop, Movie Maker, Latex
- ☐ Teaching Physics (to now in Persian) and Generating e-learning course.
For instance: Classical Mechanics (Halliday), Classical Thermodynamics (Halliday), Modern Physics (Krane), and etc.
- ☐ Advanced research and writing a scientific report
- ☐ Strategic and analytical thinking and Problem solving
- ☐ ICRANet-ISFAHAN Astronomy Meeting, Virtual Meeting, (2021)
- ☐ National Conference on Gravity and Cosmology, Institute for Research in Fundamental Sciences, Tehran, Iran (2019)
- ☐ The 1st National Conference on Mathematics and Its Application Engineering Sciences, Islamic Azad University, Jouybar Branch, Iran (2012)
- ☐ 15th Iranian Astronomy Research Conference, Institute for Advanced Studies in Basic Sciences, Zanjan, Iran (2011)

PERSONAL CHARACTERISTICS

- ☐ Creative
- ☐ Team working ability
- ☐ Time management and adaptability proficiency
- ☐ Flexible in difficult situations and hard-worker
- ☐ Quick in learning and decision making
- ☐ Interested in Psychoanalytic
- ☐ Interested in traveling and communication with different cultures

KIM Jin Young

Position: professor

Period covered:



I Scientific Work

II Conferences and educational activities

The 17th Italian-Korean Symposium for Relativistic Astrophysics

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2021 List of Publication

Deflection of light by a Coulomb charge in Born-Infeld electrodynamics, Eur. Phys. J. C 81, 508 (2021)

Lecian Orchidea Maria



Position: Professor Sapienza University of Rome,
Faculty of Medicine and Pharmacy,
Viale Regina Elena, 324- 00185 Rome, Italy.

Professor- Applied Physics
Faculty of Medicine and Dentistry, Sapienza University of Rome,
Piazzale Aldo Moro, 5- 00185 Rome, Italy.
Period covered: 2021

I Scientific Work

Research in Theoretical Physics and Mathematics.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Conferences- Contributed Talks

September 25-26, 2021, Global Webinar on Laser, Optics and Photonics, Bangalore, India, online;
Contribution: New developments of the Optical equivalence Theorem and applications.

September 22-23, 2021: European Lasers, Photonics and Optics Technologies Summit-

Elos 2021, theme 'Multifaceted aspects of Lasers, Photonics and Optics technologies' , Paris, France,
virtual event; Contribution: Developments and applications of the optical equivalence theorem.

July 5-11 2021: 24th International Workshop What Comes Beyond the Standard Models?, Bled,
Slovenia; Contribution: Statistical analyses of antimatter domains, created by nonhomogeneous
baryosynthesis in a baryon asymmetrical Universe, Bled, Slovenia.

February 22-28 2021: 1st Electronic Conference on Universe- S8. The Universe of Andrei Sakharov, Bled, Slovenia; Contribution: Studies of baryon-antibaryon annihilation in the evolution of antimatter domains in baryon-asymmetric Universe, online.

Conferences

18 October 2021: International Society for Quantum Gravity Town Hall Meeting, online.

5-7 October 2021: First International Society for Quantum Gravity ISQG Workshop,online.

8-13 Aug 2021: Symmetry 2021 - The 3rd International Conference on Symmetry, online.

5-9 July 2021: Sixteenth Marcel Grossmann Meeting on General Relativity, Virtual Meeting.

29-30 March 2021: Workshop on philosophy of dark matter, University of Wuppertal, Wuppertal, Germany.

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

Professor- Fundamentals of Mathematics
Faculty of Medicine and Pharmacy,
Sapienza University of Rome,
Viale Regina Elena, 324- 00185 Rome, Italy.

Professor- Applied Physics
Faculty of Medicine and Dentistry, Sapienza University of Rome,
Piazzale Aldo Moro, 5- 00185 Rome, Italy.

II e. *Work With Postdocs*

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. *Within ICRANet*

III b. *Outside ICRANet*

Conference Organization

International Scientific Committees 2021 3rd International Conference on Computer, Communications and Mechatronics Engineering (CCME2021)

December 17-18, 2021, Xiamen, China.

Organizing Committee Member Physics and Astronomy World Forum; Theme: Advancing the Frontiers of Physics Knowledge to Explore the Dynamics of Astronomy
02-04 December 2021, Frankfurt, Germany.

Organizing Committee Member 8th Edition of Global Conference on Catalysis, Chemical Engineering and Technology-Catalysis 2021
27-29 September 2021, Paris, France.

Program Chair Technical Committee Member
Editor 2021 International Conference on Energy, Environment, Epidemiology and Information System (IC3EIS2021) 26-27 September 2021, Beijing, China.

Scientific board Global Conference on Physics (Physics-2021); Theme: Exploring the Innovations and Modern Break Throughs in the field of Physics 13-15 September 2021, Brussels, Belgium.

Scientific Board Global Conference on Biomedical Engineering and Systems; Theme: Reshaping Technology Priorities in the Wake of Pandemic 22-24 July 2021, Barcelona, Spain.

TPC Member Reviewer 2021 International Workshop on Environmental Science and Renewable Energy Engineering (ESREE2021)
April 11-12 2021, Beijing, China.

TPC member 2021 6th International Conference on Education Reform and Modern Management (ERMM2021) 11-12 April 2021, Beijing, China.

Organizing Committee Member Geoscience 2021- 6th International Conference on Geology and Earth Science March 30, 2021, Virtual Conference.

General Chair and Editor 2021 6th International Conference on Green Materials and Environmental Engineering (GMEE2021) 2-3 February 2021, Changsha, China.

Editor Activity

Associate Editor
Open Access Journal of Engineering Sciences.

Editorial Board Committee
JPAA- Journal of Physics and Advanced Applications.

Editorial Board Member
SCIREA Journal of Mechanical Engineering (2018-ongoing).

The Open Conference Proceedings Journal (2017-ongoing).

Guest Editor Galaxies MDPI

Referee Activity

ESREE2021- 2021 International Workshop on Environmental Science and Renewable Energy Engineering .

Asia-Pacific Conference on Applied Mathematics and Statistics 2022 (AMS 2022).

2021 3rd International Conference on Computer, Communications and Mechatronics Engineering (CCME2021).

2021 5th International Conference on Electrical, Automation and Mechanical Engineering (EAME2021).

2021 6th International Conference on Green Materials and Environmental Engineering (GMEE2021).

2022 7th International Conference on Green Materials and Environmental Engineering (GMEE2022).

Asian Journal of Research and Reviews in Physics.

Journal of Applied Chemical Science International.

Physical Science International Journal.

Current Journal of Applied Science and Technology.

Fractal MDPI

Encyclopedia MDPI

Particles MDPI

Mathematics MDPI

IV. Other

Research Consortia:

The String Theory Universe COST Action - European Cooperation in Science and Technology.

e-CA COST Action CANTATA Cosmology and Astrophysics Network for Theoretical Advances and Training e-Actions (CA15117).

ISQG- International Society for Quantum Gravity.

2021 List of Publication

M.Yu. Khlopov, OML, Statistical analyses of antimatter domains, created by nonhomogeneous

baryosynthesis in a baryon asymmetrical Universe, Proceedings of 24th Workshop on What Comes Beyond the Standard Models?, BLED WORKSHOPS IN PHYSICS VOL. 22, NO. 1, 161.

OML, M.Yu. Khlopov, Analyses of Specific Aspects of the Evolution of Antimatter Glubular Clusters Domains, Astron.Rep. 65 (2021) 10, 967-972.

Maxim Y. Khlopov; OML, Baryon-Antibaryon Annihilation in the Evolution of Antimatter Domains in Baryon-Asymmetric Universe, Universe 7 (2021) 9, 347.

A.A. Kirillov, E.P. Savelova OML, On generation of a stochastic GW background by the scattering on relic wormholes, Eur.Phys.J.C 81 (2021) 3, 263.

Maxim Yu. Khlopov, OML, Effects of Baryon-Antibaryon Annihilation in the Evolution of Antimatter Domains in Baryon Asymmetrical Universe, Physical Sciences Forum 2 (2021) 1, 31.

Lee Hyung Won

Position: Professor

Period covered: Jan. 1st ~ Dec. 31st, 2021



I Scientific Work

Parameter Estimation Pipeline development for LIGO/KAGRA collaborations

Machine Learning Application for cosmology

More accurate gravitational waveform development

Developing an efficient parameter estimation software

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

Organization of 21st Italian-Korean Symposium for Relativistic Astrophysics, Aug. 2 ~ Aug. 6 2021, Seoul, Korea

III b. Outside ICRANet

Lectures for Inje University

Various lectures for gravitational wave data analysis

IV. Other

3. Hyung Won Lee, “A brief history of the Italian–Korean symposium on relativistic astrophysics”, J. Kor. Phys. Soc., **78**, 972(2021), <https://doi.org/10.1007/s40042-021-00120-3>
4. 17 LSC Collaboration papers

LIN Wenbin

Position: Dean of School of Mathematics and Physics,
University of South China, Hengyang, 421001, China
Period covered: 2021.10 - 2026.09

Position: Professor, PhD supervisor,
University of South China
Period covered: 2018.01 - present

Position: Professor, PhD supervisor,
Southwest Jiaotong University
Period covered: 2009.10 - present



I Scientific Work

1. The quasi-Keplerian motion in post-Newtonian approximations
2. Higher-order gravitational radiation damping and wave emission of binary systems
3. Frequency shift/time delay in the Kerr spacetime
4. Deep learning and reinforcement learning.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

Supervising 5 PhD students and 10 master students in the fields of general relativity and gravitation, deep learning and reinforcement learning.

II c Diploma thesis supervision

1. Ji Li, Study on the Motion of Test Particles in Kerr Field and the accuracy of the Post-Newtonian Approximation, Master Degree thesis
2. Jitao Ge, Chaos Study on celestial-body Motion in Post-Newtonian approximation, Master Degree thesis
3. Zhifeng Xiao, Study on the Precession of Kerr-Newman spacetime and Application of the Lie Series Method to the Two-body, Master Degree thesis
4. Songyuan Li, Study on the Motion of Test Particle in Reissner-nordström Spacetime, Master Degree thesis

5. Xiaoyan Zhu, Study on Parameterized Post-Post-Newtonian Light Propagation in the Field of one Spherically-Symmetric Body, Master Degree thesis

II d Other Teaching Duties

Teaching activities: Introduction for Applied Physics, Applied Software Practice

II e. Work With Postdocs

Hiroaki Nakajima

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2021 List of Publication

1. B. Yang, G. He, **W. Lin***, "The next-to-leading spin-orbit effects on the general motions in Kerr spacetime", *Phys. Scr.*, 96, 085007 (2021).
2. W. Gao, B. Yang, **W. Lin***, "The 2PN motion of the non-spinning compact binary: the Wagoner-Will-Epstein-Haugan representation", *Gravit. Cosmo.*, 27, 240 (2021).
3. H. Nakajima, **W. Lin***, "Chandrasekhar-like transformations for electromagnetic and scalar waves in Schwarzschild spacetime", *Class. Quantum Grav.*, 38, 027001 (2021).

Park Myeong-Gu

Position: Visiting Scientist

Period covered: 1st Sep. 2016 ~ 31st Aug. 2017



I Scientific Work

Physics of accretion onto black holes

Exoplanet search around giant stars

Barred galaxies

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

Teaching in Kyungpook National University, KOREA: Theoretical Astronomy, Stars and Stellar Systems, Understanding the Universe, Advanced Numerical Astronomy

Serving as the Vice President of the Korean Astronomical Society

IV. Other

2021 List of Publication

Tachyun Kim, E. Athanassoula, Kartik Sheth, Albert Bosma, Myeong-Gu Park, Yun Hee Lee, Hong Bae Ann, Cosmic Evolution Of Barred Galaxies Up To $z \sim 0.84$, The Astrophysical Journal 922:196 (2021.12.01) [10.3847/1538-4357/ac2300, arxiv.org/abs/2109.03420]

I. H. Park, K.-Y. Choi, J. Hwang, S. Jung, D.H. Kim, M.H. Kim, C.-H. Lee, K.H. Lee, S.H. Oh, M.-G. Park, S.C. Park, A. Pozanenko, C.D. Rho, N. Vedenkina, E. Won, Stellar interferometry for gravitational waves, Journal of Cosmology and Astroparticle Physics, 11(2021)008 (2021.11.04) [10.1088/1475-7516/2021/11/008, arxiv.org/abs/1906.06018]

Klaudio Peqini

Position: Visiting scientist

Period covered: 16-30 September, 2018

I Scientific Work

I have continued my work in the field of geomagnetic field modeling and complex system modeling. Recently I have performed research in pedagogical and methodological topics. The result of such work was described in the following conference presentations as follows:

1. R. Osmanaj, **K. Peqini**, D. Hyka: “QCDLAB2, A Learning Tool for Students in Lattice QCD”. Oral presentation in the Annual International Conferences on Sciences & Engineering, held virtually but planned in Athens, Greece, 19-22 July 2021.
2. J. Hoxha, **K. Peqini**, A. Uka: “Forecasting dipolar geomagnetic field from palaeo-models and synthetic models using neural networks”. Oral presentation in the Joint Scientific Assembly IAGA – IASPEI 2021, held virtually but planned in Hyderabad, India, 21-27 August 2021.
3. A. Uka, **K. Peqini**, J. Hoxha: “FORECASTING VELOCITY FIELD AT THE CORE-MANTLE BOUNDARY USING NEURAL NETWORKS”. Oral presentation in the Joint Scientific Assembly IAGA – IASPEI 2021, held virtually but planned in Hyderabad, India, 21-27 August 2021.
4. D. Prenga, **K. Peqini**, R. Osmanaj: “The study of the dynamics for electorate system by using q-distributions-a case study”. Oral presentation in the International Conference of Mathematical Modelling in Physical Sciences (IC-MSQUARE 2021), held virtually but planned in Budapest, Hungary, 06-09 September 2021.
5. **K. Peqini**, D. Prenga, R. Osmanaj: “Scaling laws and phase space analysis of a geomagnetic domino model”. Oral presentation in the International Conference of Mathematical Modelling in Physical Sciences (IC-MSQUARE 2021), held virtually but planned in Budapest, Hungary, 06-09 September 2021.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences*

etc...) and outside ICRANet (teaching activities in your university etc...]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2021 List of Publication

1. **Peqini K.**, Prenga D., Osmanaj R., 2021. Scaling laws and phase space analysis of a geomagnetic domino model. J. Phys.: Conf. Ser. 2090 012030. Impact factor: 0.547.
2. Prenga D., **Peqini K.**, Osmanaj R., 2021. The analysis of the dynamics of the electorate system by using q-distribution-a case study. J. Phys.: Conf. Ser. 2090 012073. Impact factor: 0.547.
3. **Peqini K.**, Osmanaj, R., 2021. A Computational Model of Maxwell's Distribution for Undergraduates. International Journal of Physics and Chemistry Education, 13(2), 33-45. <https://doi.org/10.51724/ijpce.v13i2.142>
4. Osmanaj Zeqirllari R., **Peqini K.**, Hyka D., 2021. The Use of PhET Simulations in Teaching Modality in High Schools in Albania before and during COVID 19-Pandemic. European Journal of Education and Pedagogy, Vol. 2, 6, 91-94. DOI: <http://dx.doi.org/10.24018/ejedu.2021.2.6.229>

Asghar Qadir

II. Date of Birth 23 July 1946

III. Academic Qualification

Degree Institution Date Subject

B.Sc. (Hons.) London University June 1967 Physics

A.R.C.S. Imperial College June 1967 Physics

D.I.C. Imperial College June 1967 Theoretical Physics

Ph.D. London University Feb. 1971 Relativity

IV. Experience

1. Vacation worker (Rutherford High Energy Laboratory, Didcot, Oxfordshire U.K); July –Sep. 1966 and July-Sep.1967.

2. Department of Mathematics, Quaid-i-Azam University (QAU) Islamabad:

(a) Research Associate Sept.1971 - Dec.1972;

(b) Asst. Prof. 1973 - Dec.1982;

(c) Assoc.Prof.1982-Oct.1987;

(d) Prof. Oct. 1987-June 2000;

(e) Meritorious Professor June 2000 to February 2004.

3. Chairman (Department of Mathematics) QAU; Sept. 1983-Aug. 1986; Sep.1988-Aug. 1994; Oct.1997-Feb.1999.

4. Dean (Faculty of Natural Sciences) QAU; March 1999 to Aug. 2000.

5. Professor (on leave from QAU) at Faculty of Mathematics and Applied Physics, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi, Swabi, NWFP, Pakistan from 17 Oct. 1993 to 28 Feb. 1994.

6. Professor (on leave from QAU) at the Department of Mathematical Sciences, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia from Nov. 1994 to June 1997 and Sept. 2000 to Jun. 2002, and Adjunct Professor at the Department of Mathematical Sciences, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia since Sept. 2002.

7. Distinguished National Professor of the Higher Education Commission of Pakistan from February 2004.

8. Director of the Centre for Advanced Mathematics and Physics (CAMP), later (2012) School of Natural Sciences (SNS) of the National University of Sciences and Technology (NUST), Rawalpindi, Pakistan, May 2004 to May 2011.

9. Professor from 21 May 2004 to 02 February 2012. Professor Emeritus 03 February 2012 to 02 February 2019. Consultant 03 February 2019 to 24 May 2019.

10. Visiting Professor at Ghulam Ishaq Khan Institute of Engineering-Sciences & Technology, Topi, Swabi (Fall 2019) and Abdus Salam-School of Mathematical Sciences, Government College University, Lahore (Spring, Fall 2020/21).

V. Conferences/Seminars, etc. Attended (Details appended):

(a) International (held abroad) >100;

(b) International (held locally) >100; (c) National >100; in the fields of Mathematics, Physics, Economics and the History and Philosophy of Science (details attached). Full list not available as it could not be updated.

VI. Teaching:

- (a)Advanced Calculus/Real AnalysisI and II (M.Sc. QAU);
- (b)Advanced CalculusIII(BS KFUPM);
- (c)Topology (M.Sc. QAU);
- (d)Linear Algebra (M.Sc.QAU);
- (e)Group Theory (M.Sc. QAU);
- (f)Differential Equations(M.Sc. QAU& BS KFUPM);
- (g)Partial Differential Equations (M.Sc. QAU);
- (h)Mechanics (M.Sc.QAU);
- (i)Differential Geometry I&II(M.SC. QAU,BS/MS KFUPM&AS-SMS);
- (j)Engineering Mathematics (BS KFUPM);
- (k)Advanced Methods of Applied Mathematics for Engineers (BS KFUPM);
- (l)Mathematical Statistics I&II(M.Sc. QAU);
- (m)Complex Analysis (M.Sc. QAU);
- (n)Numerical Methods (M.Sc. QAU);
- (o)Optimization Theory (M.Sc. QAU);
- (p)Relativity I&II (M.Sc.QAU)and Special & General Relativity (BS SNS);
- (q)Quantum MechanicsI&II(M.Sc. QAU);
- (r)Continuum Mechanics (M.Sc. QAU);
- (s)Electromagnetism (M.Sc.Maths., QAU);
- (t)Measure &Integration (M.Sc. QAU);
- (u)Functional AnalysisI (M.Sc. QAU);
- (v)Advanced EngineeringMathematics (MS KFUPM);
- (w)Partial Differential Equations (MS KFUPM);
- (x)Optimization Theory (M.Phil. Sandwich programme&later M.Sc. QAU);
- (y)Classical Theory ofFields (M.Phil. QAU, CAMP);
- (z)General Relativity (M.Phil. QAU,MS KFUPM& CAMP);(aa)Cosmology (M.Phil. QAU& Ph.D. CAMP);(bb)Spinor Formalism in Relativity (M.Phil. QAU; PhD CAMP);
- (cc)Twistor Theory (PhD CAMP);(dd)Astrophysics (M.Phil. QAU, PhD CAMP);(ee)Lie Algebras(M.Phil.QAU);(ff)Mathematics for EngineersI (BE GIKI);(gg)Elementary Differential Equations (BS KFUPM); (hh)Mathematics for Economists (In-service course atPIDE);

- (ii) Advanced Mathematics for Economists (In-service course at PIDE); (jj) Numerical Analysis (Science & Technology Training programme);
- (kk) Algebra (M.Phil. CAMP);
- (ll) Differential Equations (PhD CAMP);
- (mm) Symmetry Methods for Differential Equations I (PhD CAMP & AS-SMS), & II (PhD CAMP);
- (nn) Special Functions I & II (PhD CAMP);
- (oo) Differential Equations for Physicists (M.Phil. CAMP);
- (pp) Modern Physics (BS Phys. 3rd Semester NUST);
- (qq) General Relativity (BS Phys. 7th Semester NUST);
- (rr) Electrodynamics (M.Phil. Phys.* CAMP);
- (ss) Classical Mechanics (M.Phil. Phys. CAMP);
- (tt) Quantum Mechanics (M.Phil. Phys. CAMP);
- (uu) Thermal Physics (M.Phil. Phys. CAMP);
- (vv) Foundations of Quantum Mechanics (M.Phil. Phys. CAMP);
- (ww) Research Methodology

* All other courses are taught to Mathematics students or declared with the title of the course.

VII. Research Guidance:

(a) *Supervised 6 BS theses* (1 for IIUI and 5 at SNS NUST)

1. A review of Relativity and the cosmological constant (H. Qayyum 2018);
2. Interaction of CMB radiation with molecular hydrogen clouds (M. Sakhi 2019);
3. Black hole mining and its effects (H. Siddiqui 2019);
4. Primordial black holes: as dark matter (Z. Laraib 2019);
5. Cosmic inflation (D. Mohammad 2019);
6. Review of the problem of quantum gravity (N. Farooq);

(b) *Supervised 2 MS theses* (at KFUPM):

1. Positron and muon scattering from atoms in the impulse approximation (U. Al-Kaabi 1997) *co-supervisor Riazuddin*.
2. Effect of mass on the radiation from a relativistically rotating dipole (A. S. Al-Mohammad 2002) *co-supervisor T. Al-Aithan*.

(c) *Supervised M.Phil. dissertations 29* (QAU), *10* (NUST) *and 2* (AS-SMS):

1. The BMS group (M. F. Khan 1975);
2. Shells --- a restriction on rings (M. A. Naseer 1977);
3. Some developments in Penrose graphs (M. T. Shah 1980);
4. Pulsars and neutron stars (M. Rafique 1981);
5. Coupled Einstein equations (A. H. Bokhari 1982);
6. Critique of the Kaluza-Klein theories (A. Pervez 1986);
7. Galactic halos (S. Z. Farooqui 1986);
8. Bell's inequality and the particle interpretation of the quantum formalism (M. Ziad 1986);
9. Quantum effects near black hole singularities (A. A. Siddiqui 1990);
10. Young pulsars (M. Akbar 1990);
11. Non-gravitational fields in general relativity (A. Mughal 1990);
12. Inflationary cosmology (S. G. Mohammad 1991);
13. Symmetries of static hyperspherically symmetric five-dimensional spacetimes (S. J. Mirza 1992);
14. Ricci collineations of Robertson-Walker spacetimes (K. Hussain 1992);
15. Motion of a charged particle in the field of a pulsar (K. Saifullah 1992);
16. Ricci collineations for spherically symmetric static spacetimes (M. J. Amir 1993);

17. Numerical solutions of heat conduction between two dissimilar bodies due to a source (E. Ahmed 1993) *co-supervised by Khalid Rashid*;
18. Spherical shock gravitational waves (Q. H. Aslam 1994);
19. Ricci collineations of spacetimes admitting the four-dimensional orthogonal group (G. Shabbir 1994);
20. The connection between the Lie group of motions and Lie algebras of isometries (Q. Durrani 1998);
21. Numerical investigations of mixed elliptic and parabolic systems (S. Gul 1999) *co-supervised by T. M. Shah*;
22. An alternative explanation of density perturbation to inflation (M. Ahmed 1999);
23. Random approximation and random fixed-point theorems for 1-set contractive random maps (S. Latif 1999) *co-supervised by N. Shahzad*;
24. Spin angular momentum imparted to test particles by gravitational waves (M. Shoaib 1999);
25. Asymptotic behaviour of the proper distance and volume with York time (A. t-Hussain 2000);
26. Algebraic computation of spinors for general relativity (A. Aziz 2000) *co-supervised by A. H. Bokhari*.
27. Critique of the Hoyle-Narlikar C-field theory (Q. J. Hanif 2000);
28. Homogeneous anisotropic cosmologies (E. Nasser 2000);
29. Weyl collineations of some spacetimes and their complete classification (I. Hussain 2004).
30. Hawking radiation from primordial black holes (S. Naz 2011).
31. Complex symmetries for coupled harmonic oscillators (S. Dayo 2012).
32. Information Loss Paradox (A. Hayat 2016).
33. Colliding Impulsive Plane Gravitational Waves (K.Q. Abbasi 2016).
34. Gravitational Lensing for the Schwarzschild de-Sitter Metric (W. Pervaiz 2017).
35. Centrifugal Force Reversal in the Vicinity of a Black Hole (A. Aleem 2018).
36. Post-Newtonian Approximation for Gravitational Waves (S. Sardar 2018).
37. Boundary Conditions for the Extended Suture Model (A. Naheed 2018).
38. Cold Gas Clouds and Rotational Asymmetry in the Galactic Halos (N. Tahir 2019);

(d) Wheeler's Delayed-Choice Experiment: Mysteries, Misinterpretations, Complementarity and Measurement (M. Usman 2020).

(e) Massive Sterile Neutrinos for Dark Matter Halos, A. Yasmin, 2021, jointly with Azad A. Siddiqui;

(f) Comparison of the Fourier Transform and the Distributional Representation in the Context of the Family of Zeta Functions, A. Jamshaid, 2021;

(g) Iterative Splitting of a Complex Scalar Ordinary Differential Equation, R. Khalil, 2021.

X. Awards/Honours:

(a) First Prize in General Knowledge Contest for High School students in 1961;

(b) Fulbright Hayes award for 1978-79 and Senior Fulbright Fellowship for 1986-87, working with Prof. John A. Wheeler at the University of Texas at Austin, Texas, U.S.A.;

(c) Prize for book *Relativity: An Introduction to the Special Theory*, (World Scientific 1989) from National Book Council of Pakistan, 1991;

(d) Al Kharizmi First Prize for Mathematics for 1995;

(e) Pakistan Academy of Sciences Gold Medal for 1996;

(f) Sitara-i-Imtiaz of Pakistan for 1999;

(g) Adjunct Professor at the Department of Mathematics & Statistics, KFUPM, Saudi Arabia, 2002;

(h) ISESCO Award for Mathematics 2003;

(i) Distinguished National Professor of the Higher Education Commission of Pakistan, 2004 on (for life);

(j) Conference on General Relativity held for 60th birthday at the Department of Mathematics, Punjab University, Lahore, Pakistan, 4 – 6 October 2006;

(k) Best Researcher of the Year, NUST, December 2007;

(l) Hilal-i-Imtiaz of Pakistan for 2008;

(m) Third Italian-Pakistani Workshop on Relativistic Astrophysics, dedicated to 65th birthday in the Physics Department of Salento University of Lecce, Lecce, Italy, 22 - 24 June 2011;

(n) One-day Conference on Gravitation dedicated for 65th birthday at the Department of Mathematics, Punjab University, Lahore, Pakistan, 17 December 2011;

(o) Award of School of Computational & Applied Mathematics, The University of the Witwatersrand, Johannesburg, South Africa for contributing to the development of research of the School, 2012;

(p) Appointed Visiting Professor at the University of Witwatersrand, Johannesburg, South Africa, 1st March 2013 to 28th February 2015;

(q) Lifetime Achievement Award, Abdus Salam School of Mathematical Sciences of the Government College University, Lahore, Pakistan, November 23, 2013 for promoting and upgrading Mathematics in Pakistan;

(r) Fifth Italian-Pakistani Workshop on Relativistic Astrophysics, dedicated to 70th birthday Grand Hotel Tiziano, Lecce, Italy, 21 - 23 July 2016;

(s) One day Conferences on General Relativity held at the Department of Mathematics, Punjab University, dedicated to me on my 60th birthday, October 2006 and 65th birthday, October 2011, International Conference on Relativity and Cosmology held at the Department of Mathematics, Punjab University, dedicated to me on my 70th birthday, December 2016; and in November 2021 for my 75th birthday.

XI. Membership etc. of Academies/Societies etc:

- (a) Started the “Rocketry Society” of Government College Lahore in 1963;
- (b) Research Associate and Senior Research Fellow at the Pakistan Institute of Development Economics (PIDE), 1980-88 and 1988-94;
- (c) Joint Secretary of Al-Kindi Society for the Advancement of the Philosophy of Science, Islamabad, Pakistan, 1980- ;
- (d) Associate Member and Senior Associate of the International Centre for Theoretical Physics, Trieste, Italy, 1980 – 91 and 1992 to 1999;
- (e) Life member and Vice-President of the Albert Einstein Society (of Pakistan), 1985 on and 1987 on;
- (f) Life Member, Joint Secretary and Secretary to the Pakistan Physical Society, 1990, 1992 and 1993;
- (g) Life Member and President of the Fulbright Alumni Association, 1992 and 1993;
- (h) Fellow of Pakistan Academy of Sciences, 1992 on.

Prof. Dr. Johann Rafelski



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Arizona.EDU

Tel.: +1 520-777 9519

Personal:

Born: May 19, 1950 in Krakow, schooled in

Poland, Germany

married with [Victoria A Grossack](#), an author and actuary

D: [Susanne M. Rafelski, Ph.D.](#) at Allen Inst. for Cell Sci.

S: [Marc A. Rafelski, Ph.D.](#),

at Space Telescope Sci. Inst.

Languages spoken: English, French, German, and Polish

USA/EU citizen; **Hobbies:** skiing, history of science;

Photo: The University of Arizona Health Sciences

Kris Hanning, February 2019

Honors

Dr. Johann Rafelski is foreign member of Academia Europea and a Fellow of the American Physical Society (APS). He was an Excellence Professor of the German Research Foundation (DFG) at LMU Munich in 2008/9. Dr. Rafelski has been a Fulbright Fellow (Summers 2019 and 2021), hosted by the Wigner Research Center in Budapest. Prof. Rafelski has been elected to the

Senate of The University of Arizona for the periods 2018-2020 and 2020-2022.

CURRENT RESEARCH INTERESTS

1. **Strong Field and critical acceleration;**
2. **Cosmological Evolution from the quark era to the present;**
3. **Physics with ultra-intense light pulses; relativistic plasma; aneutronic fusion;**
4. **Creation of matter from energy (hadronization) in laboratory and in the early Universe;**
5. **Vacuum structure and quark deconfinement and quark-gluon plasma**

EDUCATION

Abitur: 1968 Goethe Gymnasium, Frankfurt/Main Prize Award

Study: 1968--71 J.W. Goethe University, Frankfurt 'Studienstiftung' Fellowship

Degrees: 1971 Diplom Physiker

1973 **Dr. Phil. Nat.**

EMPLOYMENT HISTORY, INCLUDING MAJOR VISITING ENGAGEMENTS

CURRENT Professor of Physics (tenured)

Member, Program in Appl. Math.

Affiliate, Theoretical Astrophysics

at The University of Arizona

at The University of Arizona

at The University of Arizona

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www.physics.arizona.edu/~rafelski/vitaeP.html 2/21

CAREER HISTORY

1971-73 Assistant,

Theoretische Physik **J.W. Goethe Universität, Frankfurt**

1971-93 Guest Scientist **NBS/NIST**, Washington, DC

1973-74 Postdoctoral Fellow **University of Pennsylvania**

1974-80 Postdoctoral Fellow

from 1975 Junior Staff

from 1977 on leave

Physics Division, Argonne

National Laboratory, Chicago

1977-79 Fellow **CERN, Geneva**

1979-83 C3-Prof. für Theoretische Physik **J.W. Goethe Universität Frankfurt**

1983-87 Chair of Theoretical Physics

University of Cape Town

Since 1987 Full professor with tenure

The University of Arizona

MAJOR VISITING AND CONSULTING ENGAGEMENTS

1979-21 Guest Scientist **CERN, Geneva**: sabbaticals 82/83, 86/87, 00/01, 04/5

1979-91 Guest Scientist **GSI-Darmstadt**, Germany

1983-87 Scientific Advisor MUCF research program BYU/LAMPF

Los Alamos

1992 Guest Scientist **MPI Max Planck Institut für Physik** Munich

1993-06 Guest Professor **Universit'e Paris 7, LPTHE** sabbatical 93/94

2008-09 DFG Professor **Munich Center for Advanced Photonics, LMU**

2010-16 Guest Professor **LULI, Ecole Polytechnique, Palaiseau, France**

2013-16 Science Advisor **ELI-BL** Extreme Light Infrastructure near Prague

2019-21 Fulbright Fellow **Wigner** Research Center

TEACHING and PROFESSIONAL UNIVERSITY EXPERIENCE

50 years of publication record (first research paper published Summer 1971)

45+ years lecturing with emphasis on subnuclear and foundational physics

40+ years supervision of graduate students/
PhD candidates

Development of undergraduate and
graduate curricula and University courses

Worked within the US, German, French and English University systems

Organization of international conferences, schools
and seminar meetings

Leader of multinational collaborations

Author and co-author of major research monographs (books, major reviews)

Editor: collective research accounts, conferences, historical perspectives

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PUBLICATIONS: overview

400+ works in theoretical:

atomic, nuclear, astro particle physics, neural nets; **18 BOOKS** including
monographs; several popular and general interest works; among most cited work are invited
papers

presented at conferences which are listed separate. [Google Scholar publications \(January 2022\):
21,100](#)

[citations and h=66](#) . A view on particle, and partial nuclear physics research writings via the
Stanford

Library (March 2021):

[inSPIRES: 11,700 citations and h=50](#)

Sample of strangeness and quark-gluon plasma discovery research

A dozen key works, oldest first

1. [Strangeness Production in the Quark - Gluon Plasma.](#)

J. Rafelski, B. Muller.

[Phys.Rev.Lett. 48](#)

[\(1982\) 1066 Erratum: Phys.Rev.Lett. 56 \(1986\) 2334](#)

1175 citations counted in INSPIRE; 1758 on google scholar

2. [Formation and Observation of the Quark-Gluon Plasma \(for working links see Google
Scholar\)](#)

J.

Rafelski [Phys.Rept. 88 \(1982\) 331-347](#)

238 citations counted in INSPIRE; 405 on google scholar

3. [Strangeness in Relativistic Heavy Ion Collisions \(Review\) P.Koch, B. Muller, J. Rafelski.](#)

[Phys.Rept. 142 \(1986\) 167-262](#)

1018 citations counted in INSPIRE; 1513 on google scholar

4. [Strange anti-baryons from quark-gluon plasma.](#)

J. Rafelski.

[Phys.Lett. B 262 \(1991\) 333-340.](#)

233 citations counted in INSPIRE; 392 on google scholar

5. [Strange particles from dense hadronic matter.\(Review\)](#)

J. Rafelski, J. Letessier, A. Tounsi,

[\[nuclth/](#)

[0209080\] Acta Phys.Polon. B 27 \(1996\) 1037-1140](#)

79 citations counted in INSPIRE; 107 on google scholar

6. [Sudden hadronization in relativistic nuclear collisions.](#)

J. Rafelski, J. Letessier. [arXiv](#)

[preprint:hep-ph/0006200 Phys.Rev.Lett. 85 \(2000\) 4695-4698](#)

100 citations counted in INSPIRE; 129 on google scholar

[A strange quark plasma](#) E. Quercigh, J. Rafelski.

[Phys. World](#) 13 (2000) no.10, pp 37-42.

A feature article in the Physics World magazine following CERN new state of matter announcement

7. [Enhanced \$J/\psi\$ production in deconfined quark matter.](#)

R.L. Thews, M. Schroedter, J. Rafelski.

[arXiv preprint:hep-ph/0007323](#) *Phys.Rev. C* 63 (2001) 054905

560 citations counted in INSPIRE; 856 on google scholar

8. [Strange hadron resonances as a signature of freezeout dynamics.](#)

G. Torrieri, J. Rafelski. [arXiv](#)

[preprint:hep-ph/0103149](#) *Phys.Lett. B* 509 (2001) 239-245

136 Citations counted in INSPIRE; 197 on google scholar

9. [Hadrons and quark-gluon plasma.](#)

J. Letessier, J. Rafelski.

[Camb.Monogr.Part.Phys.Nucl.Phys.Cosmol.](#) 18 ISBN: 9780521018234 (Paperback), 9780521385367

(Hardback), 9780511037276 (Online)

413 pages, (Cambridge University Press,(2002).

79 book citations counted in INSPIRE; 311 on google scholar

10. [Hadron production and phase changes in relativistic heavy ion collisions.](#)

J. Letessier, J. Rafelski.

[arXiv preprint:nucl-th/0504028](#) *Eur.Phys.J. A* 35 (2008) 221-242

124 citations counted in INSPIRE; 125 on google scholar

11. [Melting Hadrons, Boiling Quarks \(Review\)](#)

J. Rafelski [arXiv preprint:1508.03260](#) *Eur.Phys.J. A*

(Article) 51 (2015) no.9, 1-58, 114 ;

Eur.Phys.J. A (Addendum A) 51 (2015) no.9, 1-16, 115 ; *Eur.Phys.J. A (Addendum B)* 51. (2015)

no.9, 1-9, 116 .

33 citations counted in INSPIRE; 52 citations on google scholar

12. [Discovery of Quark-Gluon-Plasma: Strangeness Diaries](#) Johann Rafelski [arXiv](#)

[preprint:1911.00831](#) *The European Physical Journal Special Topics* 229 (2020) no.1, pp1-140

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[www.physics.arizona.edu/~rafelski/vitaeP.html](#) 4/21

List of Refereed Publications

listed further below are: 1) invited research and (refereed) conference reports; 2) books; and 3) general

science writings

Newest first

1. [Radiation reaction and limiting acceleration](#)

Will Price, Martin Formanek, Johann Rafelski

[arXiv](#)

[preprint: 2112.04444](#) [hep-ph]

Phys.Rev. D in press

2. [Particle production at a finite potential step: transition from Eulerâ€™Heisenberg to Klein paradox](#)

Stefan Evans, Johann Rafelski

[arXiv preprint: 2108.12959](#) [hep-ph]

Eur.Phys.J.A 57

(2021) 12, 341

3. Cosmological Strangeness Abundance

Cheng Tao Yang, Johann Rafelski

arXiv

preprint:2108.01752 [hep-ph]

under review *Phys. Lett. B*

4. Current-conserving relativistic linear response for collisional plasmas

arXiv preprint:2105.07897

[physics.plasm-ph]

Annals Phys. 434 (2021) 168605

5. Motion of classical charged particles with magnetic moment in external plane-wave electromagnetic fields

Martin Formanek, Andrew Steinmetz, Johann Rafelski arXiv preprint:

2103.02594 [physics.class-ph]] *Phys.Rev. A* 103 (2021) 052218 $\ddot{\epsilon}^{1/4}$

6. Radiation reaction friction: Resistive material medium

Martin Formanek, Andrew Steinmetz,

Johann Rafelski arXiv preprint: 2004.09634 [hep-ph] *Phys.Rev. D* 102 (2020) 5, 056015 $\ddot{\epsilon}^{1/4}$

7. Electron electromagnetic-mass melting in strong fields Stefan Evans, Johann Rafelski arXiv preprint:1911.08714 [hep-ph] *Phys.Rev. D* 102 (2020) 3, 036014

8. Discovery of Quark-Gluon-Plasma: Strangeness Diaries Johann Rafelski arXiv

preprint:1911.00831 *The European Physical Journal Special Topics* 229 (2020) no.1, pp1-140

(also

listed under book-like monographies)

9. Classical neutral point particle in linearly polarized EM plane wave field

Martin Formanek,

Andrew Steinmetz, Johann Rafelski arXiv preprint:1904.10587 *Plasma Phys.Control.Fusion* 61 (2019) no.8, 084006

10. Lepton Number and Expansion of the Universe

CT Yang, J Birrell, J Rafelski (under review)

arXiv preprint:1812.05157

11. Magnetic Dipole Moment in Relativistic Quantum Mechanics

A Steinmetz, M Formanek, J

Rafelski arXiv preprint arXiv:1811.06233

Eur.Phys.J. A 55, no. 3, 40 (2019)

12. Virtual axion-like particle complement to Euler-Heisenberg-Schwinger action S Evans, J Rafelski

arXiv preprint arXiv:1810.06717

Phys. Lett. B 791, 331 (2019)

13. Temperature Dependence of the Neutron Lifespan CT Yang, J Birrell, J Rafelski (under review)

arXiv preprint arXiv:1805.06543

14. Vacuum stabilized by anomalous magnetic moment S Evans, J Rafelski arXiv preprint arXiv:1805.03622

Physical Review D 98, 016006 (2018)

15. Strong fields and neutral particle magnetic moment dynamics

M Formanek, S Evans, J Rafelski,

A Steinmetz, CT Yang arXiv preprint:1712.07698

Plasma Physics and Controlled Fusion 60, (7),

074006

16. Measurement of the Lorentz-FitzGerald Body Contraction.

J. Rafelski arXiv preprint:1708.05670

Eur.Phys.J. A 54, no.2, 29 (2018)

17. Relativistic Dynamics of Point Magnetic Moment.
J. Rafelski, M. Formanek, A. Steinmetz. [arXiv preprint:1712.01825](#) *Eur.Phys.J. C* 78 no.1, 6 (2018)
18. From strangeness enhancement to quark-gluon plasma discovery.
P. Koch, B. Muller, J. Rafelski.
[\[arXiv:1708.08115 \[nucl-th\]\]](#). *Int.J.Mod.Phys. B* 32 no.31, 1730024 (2017)
19. The relativistic foundations of synchrotron radiation.
G. Margaritondo, J. Rafelski.
[\[arXiv:1706.01329 \[physics.gen-ph\]\]](#). *J.Synchrotron Radiat.* 24 (2017) no.4, 898-901.
20. Dynamical Emergence of the Universe into the False Vacuum.
J. Rafelski, J. Birrell.
[\[arXiv:1510.05001 \[astro-ph.CO\]\]](#). *JCAP* 1511 (2015) no.11, 035.
21. Melting Hadrons, Boiling Quarks. (Review)
J. Rafelski. [\[arXiv:1508.03260 \[nucl-th\]\]](#) *Eur.Phys.J. A* 51 (2015) no.9, 114.
22. Relic Neutrino Freeze-out: Dependence on Natural Constants.
J. Birrell, C.T. Yang, J. Rafelski.
[\[arXiv:1406.1759 \[nucl-th\]\]](#). *Nucl.Phys. B* 890 (2014) 481-517.
23. Quark-gluon plasma as the possible source of cosmological dark radiation.
J. Birrell, J. Rafelski.
[\[arXiv:1404.6005 \[nucl-th\]\]](#). *Phys.Lett. B* 741 (2015) 77-81.
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www.physics.arizona.edu/~rafelski/vitaeP.html 5/21
24. Boltzmann Equation Solver Adapted to Emergent Chemical Non-equilibrium.
J. Birrell, J. Wilkening, J. Rafelski. [\[arXiv:1403.2019 \[math.NA\]\]](#). *J.Comput.Phys.* 281 (2015) 896-916.
25. Proposal for Resonant Detection of Relic Massive Neutrinos.
J. Birrell, J. Rafelski.
[\[arXiv:1402.3409 \[hep-ph\]\]](#). *Eur.Phys.J. C* 75 (2015) no.2, 91.
26. SHARE with CHARM.
M. Petran, J. Letessier, J. Rafelski, G. Torrieri. [\[arXiv:1310.5108 \[hep-ph\]\]](#)
Comput.Phys.Commun. 185 (2014) 2056-2079.
27. Fugacity and Reheating of Primordial Neutrinos.
J. Birrell, C.T. Yang, P. Chen, J. Rafelski.
[\[arXiv:1303.2583 \[astro-ph.CO\]\]](#). *Mod.Phys.Lett. A* 28 (2013) 1350188.
28. Fusion reactions initiated by laser-accelerated particle beams in a laser-produced plasma.
C. Labaune, C. Baccou, S. Depierreux, C. Goyon, G. Loisel, V. Yahia, J. Rafelski. [\[arXiv:1310.2002 \[physics.plasm-ph\]\]](#). *Nature Commun.* 4 (2013) 2506.
29. Hadron production and quark-gluon plasma hadronization in Pb-Pb collisions at $\sqrt{s_{NN}}=2.76\text{TeV}$.
M. Petran, J. Letessier, V. Petracek, J. Rafelski. [\[arXiv:1303.2098 \[hep-ph\]\]](#)
Phys.Rev. C 88 (2013) no.3, 034907.
30. Universal hadronization condition in heavy ion collisions at $\sqrt{s_{NN}}=62\text{GeV}$ and at $\sqrt{s_{NN}}=2.76\text{TeV}$.
M. Petran, J. Rafelski. [\[arXiv:1303.0913 \[hep-ph\]\]](#) *Phys.Rev. C* 88 (2013) no.2, 021901.
31. Relic neutrinos: Physically consistent treatment of effective number of neutrinos and neutrino mass.
J. Birrell, C.T. Yang, P. Chen, J. Rafelski. [\[arXiv:1212.6943 \[astro-ph.CO\]\]](#). *Phys.Rev. D* 89

- (2014) 023008.
32. Top anomalous magnetic moment and the two photon decay of Higgs boson.
L. Labun, J. Rafelski. [\[arXiv:1209.1046 \[hep-ph\]\]](#). *Phys.Rev. D* 88 (2013) 071301.
 33. Acceleration and Vacuum Temperature.
L. Labun, J. Rafelski. [\[arXiv:1203.6148 \[hep-ph\]\]](#). *Phys.Rev. D* 86 (2012) 041701.
 34. Properties of Gravitationally Bound Dark Compact Ultra Dense Objects.
Ch. Dietl, L. Labun, J. Rafelski. [\[arXiv:1110.0551 \[astro-ph.CO\]\]](#). *Phys.Lett. B* 709 (2012) 123-127.
 35. Electron-Positron Plasma Drop Formed by Ultra-Intense Laser Pulses.
I. Kuznetsova, J. Rafelski. [\[arXiv:1109.3546 \[physics.plasm-ph\]\]](#). *Phys.Rev. D* 85 (2012) 085014.
 36. Compact Ultradense Matter Impactors.
J. Rafelski, L. Labun, J. Birrell. [\[arXiv:1104.4572 \[astroph. EP\]\]](#). *Phys.Rev.Lett.* 110 (2013) no.11, 111102.
 37. Non-Perturbative Relativistic Calculation of the Muonic Hydrogen Spectrum.
J.D. Carroll, A.W. Thomas, J. Rafelski, G.A. Miller. [\[arXiv:1104.2971 \[physics.atom-ph\]\]](#). *Phys.Rev. A* 84 (2011) 012506.
 38. Spectra of Particles from Laser-Induced Vacuum Decay.
L. Labun, J. Rafelski. [\[arXiv:1102.5773 \[hep-ph\]\]](#). *Phys.Rev. D* 84 (2011) 033003.
 39. Natural Resolution of the Proton Size Puzzle.
G.A. Miller, A.W. Thomas, J.D. Carroll, J. Rafelski. [\[arXiv:1101.4073 \[physics.atom-ph\]\]](#) *Phys.Rev. A* 84 (2011) 020101.
 40. Particle Production in $s_{NN} = 2.76$ TeV Heavy Ion Collisions.
J. Rafelski, J. Letessier. [\[arXiv:1012.1649 \[hep-ph\]\]](#) *Phys.Rev. C* 83 (2011) 054909.
 41. Vacuum Structure and Dark Energy.
L. Labun, J. Rafelski. [\[arXiv:1011.3497 \[hep-ph\]\]](#). *Int.J.Mod.Phys. D* 19 (2010) 2299-2304.
 42. Effects of Radiation-Reaction in Relativistic Laser Acceleration.
Y. Hadad, L. Labun, J. Rafelski, N. Elkina, C. Klier, H. Ruhl. [\[arXiv:1005.3980 \[hep-ph\]\]](#) *Phys.Rev. D* 82 (2010) 096012.
 43. Unstable Hadrons in Hot Hadron Gas in Laboratory and in the Early Universe.
I. Kuznetsova, J. Rafelski. [\[arXiv:1002.0375 \[hep-th\]\]](#). [\[arXiv:1002.0375 \[hep-th\]\]](#) *Phys.Rev. C* 82 (2010) 035203
 44. Multistrange Particle Production and the Statistical Hadronization Model.
M. Petran, J. Rafelski. [\[arXiv:0912.1689 \[hep-ph\]\]](#) *Phys.Rev. C* 82 (2010) 011901
 45. Thermal reaction processes in a relativistic QED plasma drop.
I. Kuznetsova, D. Habs, J. Rafelski. [\[arXiv:0911.0118 \[physics.plasm-ph\]\]](#). *Phys.Rev. D* 81 (2010) 053007.
 46. The Confinement Property in SU(3) Gauge Theory.
A.V. Zayakin, J. Rafelski. [\[arXiv:0905.2317 \[hep-ph\]\]](#). *Phys.Rev. D* 80 (2009) 034024.
 47. Dark Energy Simulacrum in Nonlinear Electrodynamics.
L. Labun, J. Rafelski. [\[arXiv:0811.4467 \[hep-th\]\]](#). *Phys.Rev. D* 81 (2010) 065026.

48. Resonance Production in Heavy Ion Collisions: Suppression of Lambda(1520) and Enhancement of Sigma(1385).
I. Kuznetsova, J. Rafelski. [arXiv:0811.1409 [nucl-th]] *Phys.Rev. C* 79 (2009) 014903
49. QED Energy-Momentum Trace as a Force in Astrophysics.
L. Labun, J. Rafelski.
[arXiv:0810.1323 [hep-ph]]. *Phys.Lett. B* 687 (2010) 133-138.
10/01/22, 09:24 JohannRafelskiCurriculumVitae
www.physics.arizona.edu/~rafelski/vitaeP.html 6/21
50. Vacuum Decay Time in Strong External Fields.
L. Labun, J. Rafelski. [arXiv:0808.0874 [hep-ph]].
Phys.Rev. D 79 (2009) 057901.
51. Enhanced Production of Delta and Sigma(1385) Resonances.
I. Kuznetsova, J. Rafelski.
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52. Pion and muon production in e-, e+, gamma plasma.
I. Kuznetsova, Dietrich Habs, J. Rafelski.
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53. Hadron Resonances and Phase Threshold in Heavy Ion Collisions.
G. Torrieri, J. Rafelski. [nuclth/
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54. Heavy flavor hadrons in statistical hadronization of strangeness-rich QGP.
I. Kuznetsova, J. Rafelski. [hep-ph/0607203] *Eur.Phys.J. C* 51 (2007) 113-133
55. SHAREv2: Fluctuations and a comprehensive treatment of decay feed-down.
G. Torrieri, S. Jeon,
J. Letessier, J. Rafelski. [nucl-th/0603026] *Comput.Phys.Commun.* 175 (2006) 635-649
56. Strangeness chemical equilibration in QGP at RHIC and CERN LHC.
J. Letessier, J. Rafelski.
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58. Balance of baryon number in the quark coalescence model.
A. Bialas, J. Rafelski. [hep-ph/
0508084]. *Phys.Lett. B* 633 (2006) 488-491.
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Pin-zhen Bi, J. Rafelski. [nucl-th/0507037].
Eur.Phys.J. A 32 (2007) 267-272.
60. Centrality dependence of strangeness and (anti)hyperon production at RHIC.
J. Letessier, J. Rafelski. [nucl-th/0506044] *Phys.Rev. C* 73 (2006) 014902
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J. Rafelski, J. Letessier. [hep-ph/0506140] *Eur.Phys.J C* 45 (2006) 61-72
62. Hadron production and phase changes in relativistic heavy ion collisions.
J. Letessier, J. Rafelski.
[nucl-th/0504028] *Eur.Phys.J. A* 35 (2008) 221-242
63. Particle yield fluctuations and chemical non-equilibrium at RHIC.
G. Torrieri, S.Y. Jeon, J.

- Rafelski. [nucl-th/0503026]. *Phys.Rev. C* 74 (2006) 024901.
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J. Rafelski, J. Letessier, G. Torrieri.
[nucl-th/0412072]
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65. SHARE: Statistical hadronization with resonances.
G. Torrieri, S. Steinke, W. Broniowski, W.
Florkowski, J. Letessier, J. Rafelski. [nucl-th/0404083] *Comput.Phys.Commun.* 167 (2005) 229-251
66. Strange pentaquark hadrons in statistical hadronization.
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Rafelski. [hep-ph/0310188] *Phys.Rev. C* 68 (2003) 061901
67. QCD equations of state and the QGP liquid model.
J. Letessier, J. Rafelski. [hep-ph/0301099].
Phys.Rev. C 67 (2003) 031902.
68. Statistical hadronization probed by resonances.
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69. Limit on CPT violating quark anti-quark mass difference from the neutral kaon system.
M. J.
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P.C. McGuire, H.
Bohr, J.W. Clark, R. Haschke, C.L. Pershing, J. Rafelski.
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J. Letessier, J. Rafelski. [hep-ph/
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72. Strange hadrons and their resonances: A Diagnostic tool of QGP freezeout dynamics.
J. Rafelski,
J. Letessier, G. Torrieri. [nucl-th/0104042] *Phys.Rev. C* 64 (2001) 054907 Erratum: *Phys.Rev. C* 65 (2002) 069902
73. Strange hadron resonances as a signature of freezeout dynamics.
G. Torrieri, J. Rafelski. [hep-ph/
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74. Entropy production in relativistic hydrodynamics.
H.-T. Elze, J. Rafelski, L. Turko. [hep-ph/
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75. Search for QGP and thermal freezeout of strange hadrons.
G. Torrieri, J. Rafelski. [hep-ph/
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Rafelski. *NATO Sci.Ser.B* 346 (1995) 105-116

iii. [Entropy in heavy ion collisions.](#)

J. Letessier, J. Rafelski, A. Tounsi.

NATO Sci.Ser.B 346 (1995) 223-232

iv. [Dilepton spectra in heavy ion collisions.](#)

J. Letessier, J. Rafelski, A. Tounsi. *NATO Sci.Ser.B* 346 (1995) 363-366

v. [Miniworkshop on strangeness](#) J. Rafelski *NATO Sci.Ser.B* 346 (1995) 387-398

vi. [Strangeness in hot hadronic matter.](#)

J. Rafelski, J. Letessier, A. Tounsi *NATO Sci.Ser.B* 346 (1995) 479-492

11. (Edited conference proceedings) [Particle production in highly excited matter.](#) H.H. Gutbrod, J.

Rafelski. *NATO Sci.Ser.B* 303 (1993) pp.1-689 ISBN 978-1-4615-2940-8

Proceedings: NATO

Advanced Study Institute, Il Ciocco, Italy, Jul 12-24, 1992.

i. [Big bang in the laboratory.](#)

H.H. Gutbrod, J. Rafelski. *NATO Sci.Ser.B* 303 (1993) 1-9.

ii. [On the trail of quark gluon plasma: Strange anti-baryons in nuclear collisions.](#)

J. Rafelski.

NATO Sci.Ser.B 303 (1993) 529-544.

12. (Edited conference proceedings) [Hadronic matter in collision 1988.](#)

P. Carruthers, J. Rafelski.

(World Scientific 1989), 840p. ISBN 9971-50-849-4, 6-12 Oct 1988. Tucson, AZ USA

i. [Nuclear Stopping Power: QCD Showers and Density Fluctuations](#)

M. Danos, J. Rafelski. pp.

332-341

ii. [Strange Particle Signatures of the Hadronic Matter Deconfinement Phase Transition.](#) J.

Rafelski.

pp.776--790; Concluding article in section: [Strangeness and Phase Transitions.](#)

13. (Chapters contributed to:)

[Computer Simulation in Brain Science](#), ISBN 9780521341790

(Hardback) ISBN 9780521061186 (Paperback), Edited by Rodney M. J. Cotterill (Cambridge UP 1988) 566p

10/01/22, 09:24 JohannRafelskiCurriculumVitae

www.physics.arizona.edu/~rafelski/vitaeP.html 21/21

i. [Topology, structure, and distance in quasirandom neural networks.](#)

J.W. Clark, G.C.

Littlewort, J. Rafelski.
 p. 104-118 in [Computer Simulation in Brain Science](#), (Cambridge UP 1988, 2008)

ii. Access and stability of cyclic modes in quasirandom networks of threshold neurons obeying a determinisitic synchronous dynamics.
 J.W. Clark, K.E. Kurten, J. Rafelski.
 p. 316-344 in
[Computer Simulation in Brain Science](#), (Cambridge UP 1988, 2008)

iii. Transition to cycling in neural networks.
 G.C. Littlewort, J.W. Clark, J. Rafelski.
 p. 345-356
 in [Computer Simulation in Brain Science](#), (Cambridge UP 1988, 2008)

14. (Edited conference proceedings) [Muon-Catalized Fusion MuCF1988](#) S.E. Jones, J. Rafelski, H.J. Monkhurst. [AIP Conf.Proc. 181 \(1988\) 467p](#). ISBN: 0-88318-381-1 Sanibel Island, Florida, May 1-6, 1988.

i. [Possible influence of vacuum polarization on muon catalyzed D-T fusion](#).
 B. Muller, J. Rafelski, M. Jndel, S.E. Jones. [AIP Conf.Proc. 181 \(1988\) 105-110](#)

ii. MuCF with $Z > 1$ nuclei.
 D. Harley, B. Muller, and J. Rafelski.
[AIP Conf.Proc. 181 \(1988\) 239-244](#)

iii. [The Challenges of Muon Catalyzed Fusion](#).
 J. Rafelski. [AIP Conf.Proc. 181 \(1988\) 451-464](#)

15. (Book) [Quantum Electrodynamics of Strong Fields](#).
 W. Greiner, B. Muller, J. Rafelski. ISBN 978-3642822742 (Soft cover); ISBN 978-3-642-82272-8 (on-line) (Springer 1985) p.594

16. (Popular science book) [The Structured Vacuum](#). B. Muller, J. Rafelski. ISBN 3-87144-889-3 H.
[Deutsch Verlag \(Frankfurt, Thun, 1985\) 198 p.](#) (ISBN 3-87144-888-5: German translation)

17. (Abridged edition of) *NBS Handbook of Math. Functions* Pocketbook of Mathematical Functions,
 Eds: M. Danos and J. Rafelski
 ISBN 3-87144-818-4 H. Deutsch Verlag, (Frankfurt, Thun, 1984)

18. (Lecture course in German) [Special Theory of Relativity](#) W. Greiner, J. Rafelski. ISBN 3-87144-711-0 (1st Edition) (H. Deutsch, Frankfurt 1984) p.322;
 ISBN 3-8171-1063-4 (2nd Edition) (H. Deutsch, Frankfurt, Thun 1989) p.291;
 ISBN 3-8171-1205-X; reprinted ISBN13 978-3-8171-1205-0 (3rd Edition) (H. Deutsch, Frankfurt, Thun 1992) p.319 (+35 AE reprints),
 General Interest; Popular Science

1. Inside Story: Birth of the Hagedorn temperature
 J. Rafelski.
[CERN Cour. 54 N12 \(2014\) 57](#).

2. The light-pulse horizon G. Mourou, J. Rafelski, T. Tajima.
 On line and pdf: [CERN Cour. 49 N3 \(2009\) 21-23](#).

3. The tale of the Hagedorn temperature.
J. Rafelski, T. Ericson. *CERN Cour.* 43 N7 (2003) 30-33.
4. A strange quark plasma.
E. Quercigh, J. Rafelski.
Phys. World 13 (2000) no.10, pp 37-42.
5. The quark gluon plasma revisited?.
J. Rafelski. *Phys. World* 9N7 (1996) 23-24.
6. *Muons in fusion.*
J. Rafelski, H.E. Rafelski. *Particle World: communications in subatomic physics.*
Editor: Robert Klapisch 2 (1991) no.1, 10-20.
7. *Vacuum structure: An Essay.*
J. Rafelski.
*in Vacuum Structure in Intense Fields, NATO Advanced
Study Institute, Series B: Physics, 255 (1991) 1-28*
*Presented at Cargese Summer School: 30 Jul-11
Aug 1990. Cargese, France*
8. *Cold Nuclear Fusion (Muon Catalyzed Fusion)*
J. Rafelski and S.E. Jones
Scientific American 257
(1987) 84-89 No. 1 (July 1987),

Raffaelli Bernard



Position: **Associate Professor of Physics**,
ESME – Graduate School of Engineering,
Department of Physics - Lyon Campus,
16, rue de l'Abbaye d'Ainay – 69002 Lyon, France.
Period covered: August 2016 – Today

and

Affiliated researcher at

Institut de Mathématiques de Bourgogne (UMR 5584 CNRS)
9 avenue Alain Savary
BP 47870
21078 Dijon Cedex

Period covered: October 2020 – Today

I Scientific Work

- Quantum Field theory in curved spacetime: Hadamard renormalization of the energy-momentum tensor of a quantum field theory and problems related to the vacuum energy in General Relativity.
- High energy black hole physics: semiclassical description of resonant scattering by black holes and applications to quasinormal modes, strong gravitational lensing, gravity/CFT correspondence.
- Gauge theories of gravity.
- Spinor approaches to spacetime and matter.
- Topological quantum computation and quantum engineering.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

Teaching activities at ESME – Graduate School of Engineering, Lyon Campus:

- For 1st year students: Mechanics, Fluid Mechanics, Thermodynamics,
- For 2nd year students: Wave Physics, Electromagnetism,
- For 3rd year students: Quantum Physics, Optimization techniques (Applied Mathematics)

IV. Other

2021 List of Publication

- (submitted) “Hidden conformal symmetry on the black hole photon sphere”, B Raffaelli, arXiv: 2112.12543 [gr-qc]
- (To appear) Chap5: “A quantum and historical look at the status of inertia in Physics”, JP Provost and B Raffaelli, in Jijel’s School of Theoretical Physics Proceedings: “Topics in Mathematical Physics, Quantum Physics and Path Integrals”, edited by A Bounames and A Makhlouf, ISTE Sciences Publishing eds.

Rastegarnia Fatemeh

Position: Phd Student 2021-
Period covered:



I Scientific Work

GRBs, Deep Learning

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Sixteenth Marcel Grossmann Meeting 5-10 July 2021 talk title: Deep Learning in Searching the Spectroscopic Redshift of Quasars

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

2021 List of Publication

1. Deep Learning in Searching the Spectroscopic Redshift of Quasars. F. RastegarNia, M. T. Mirtorabi, R. Moradi, A. Vafaei. Sadr, Y. Wang, MNRAS DOI: 10.1093/mnras/stac076
2. The mass and spin of black hole and emission of the “blackholic quanta” in GRB 180720B obtained from the ultrarelativistic prompt emission (UPE) phase, F. RastegarNia, R. Moradi, J. A. Rueda, R. Ruffini, Liang. Li, S. E. Askestani, Y. Wang, S. S. Xue, Submitted to PRD
3. Askestani, Y. Wang, S. S. Xue, Submitted to PRD

Ivan Rybak

Position: researcher at the Instituto de Astrofísica e Ciências do Espaço, CAUP, Porto, Portugal.

Period covered: **September 22-23, 2021**

(academic visit+seminar)



I Scientific Work

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

1. ICRANet Seminar, 22 September, 2021,

“Cosmic (super/superconducting) strings as a probe of high energy physics”.

Abstract: The theoretical possibility of cosmic strings existence was suggested in the 1970s. Since that time, these hypothetical objects have passed through the ups and downs of scientific community attention. Cosmic strings evoked particular interest in the 2000s, whereby implementing superstring theory to the early universe description, we "have discovered cosmic strings lurking everywhere in the undergrowth", as was expressed by Tom Kibble. Nowadays, many scenarios that extend the Standard Model of particles physics suggest the production of cosmic string. Future missions, such as LISA, with improved observational facilities, will probe models where cosmic strings occur, thereby shedding light on possible early universe scenarios. In this talk, I will make a short overview of models where cosmic strings take place. I will provide state of the art methods to study the evolution of cosmic strings and explain why we should pay attention to cosmic superconducting and (super)strings. I will conclude with current and future observational constraints on cosmic strings.

2. Chairperson, 5-10 July, MG-16, session “From cosmic strings to superstrings”

Sang Pyo Kim



Position: Professor, Kunsan National University, Visiting professor at Institute of Theoretical Physics, CAS, China

Period covered: 2021.01.01-2021.12.31

I Scientific Work

(i) Studied Hawking radiation as well as Schwinger effect in (near-)extremal KN-(A)dS black holes (ii) Explored the QED vacuum polarization effect in supercritical magnetic fields and applied to astrophysics, such as magnetars (iii) Investigated in the phase-integral formulation pair production in a constant electric field assisted by an oscillating electric field.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

*Organized the 17th Italian-Korean Symposium on Relativistic Astrophysics
Kusan National University, CQUeST-Sogang University, ICRANet
August 2 (Mon)-6(Fri), 2021

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

- (ii) AAPPs-DACG Workshop on Astrophysics, Cosmology and Gravitation at APCTP, October 4(Mon)-8 (Fri), 2021, IOC chair

IV. Other

- (iii) 2021.1-2023.12: Chair, DACG (Division of Astrophysics, Cosmology and Gravitation), AAPPs (Association of Asia Pacific Physics Societies)
- (iv) 2020.1-2022.12: President, APCosPA Org (Asia Pacific Cosmology and Particle Astrophysics Organization)

2022 List of Publication

- (vi) C. M. Kim and S. P. Kim, “Magnetars as Laboratories for Strong Field QED,” e-Print: [2112.02460](#)
- (vii) C-M. Chen and S. P. Kim, “Dyon Production from Near-Extremal Kerr-Newman-(Anti-)de Sitter Black Holes, “ e-Print: [2111.14124](#) [hep-th]
- (viii) J. Zhang, Y-Y. Lin, H-C. Liang, K-J. Chi, C-M. Chen, S. P. Kim and J-R. Sun, “Pair production in Reissner-Nordström-Anti de Sitter black holes,” Chin. Phys. C 45 (2021) 6, 065105
- (ix) L. Liu, Ø. Christiansen, W-H. Huang, Z-K Guo, R-G. Cai and S. P. Kim, “Gravitational and electromagnetic radiation from binary black holes with electric and magnetic charges: elliptical orbits on a cone,” Eur. Phys. J. C 81 (2021) 11, 1048
- (x) C. M. Kim, A. Fedotov and S. P. Kim, “Phase-Integral Formulation of Dynamically Assisted Schwinger Pair Production,” e-Print: [2109.10268](#) [hep-ph]

Soroush Shakeri



Current position: *Assistant Professor at Isfahan University of Technology (IUT)*
The Head of ICRANet-Isfahan
Adjunct Professor ICRANet, Italy

Date of Birth : 14/07/1988

Place of Birth : Ahvaz, Iran

Address : Department of Physics,
Isfahan University of Technology, Isfahan 84156-83111, Iran

Telephone : +98 09387106317

E-mail : s.shakeri@iut.ac.ir

Place of Birth. : Ahvaz, Iran

Homepage. : <https://shakeri.iut.ac.ir>

• *Scientific Area*

- *Astroparticle Physics*
- *High Energy Astrophysical Phenomena*
- *Gamma Ray Bursts (GRBs)*
- *Dark Matter - Direct and Indirect Detections*
- *Strong Field QED Phenomena*
- *Early Universe Cosmology*
- *List of Publication - 2021*

Davood Rafiei Karkevandi, Soroush Shakeri, Violetta Sagun, Oleksii Ivanytskyi, **Bosonic Dark Matter in Neutron Stars and its Effect on Gravitational Wave Signal**,
Phys. Rev. D 105, 023001 (2022), [[arXiv:2109.03801v2](https://arxiv.org/abs/2109.03801v2)]

Davood Rafiei Karkevandi, Soroush Shakeri, Violetta Sagun, Oleksii Ivanytskyi, **Tidal Deformability as a Probe of Dark Matter in Neutron Stars**,
Contribution to: [MG16](#), [[arXiv:2112.14231](https://arxiv.org/abs/2112.14231)]

Aidin Momtaz, Mohammad Hossein Salimi, Soroush Shakeri, **Estimating the Photometric Redshifts of Galaxies and QSOs Using Regression Techniques in Machine Learning**,
Contribution to: [MG16](#), [[arXiv:2201.04391](https://arxiv.org/abs/2201.04391)]

Shedding New Light on Sterile Neutrinos from XENON1T Experiment, Soroush Shakeri, Fazlollah Hajkarim, She-Sheng Xue, **JHEP12(2020)194**, [[arXiv:2008.05029](https://arxiv.org/abs/2008.05029)]

• *Service Activities Within ICRANet*

• *Organizing ICRANet-Isfahan Astronomy virtual Meeting 3 - 5 November 2021*

Chair of Organizing Committee - Member of Scientific Committee

In collaboration with ICRANet-Italy, In ICRANet-Isfahan, We have organized the First Series of online ICRANet-Isfahan Astronomy Meeting from November 3 to November 5, 2021. ICRANet-Isfahan virtually hosted more than 33 prominent invited speakers from more than 16 countries. There were more than 190 registered participants and attendees. This meeting was inaugurated with the honorary support and a message from the Minister of Science, Research and Technology of the Islamic Republic of Iran, H.E. Mohammad Ali Zolfi Gol. This meeting provided a great opportunity for discussing about topics ranging from the ancient Persian astronomy to recent developments in observational astronomy, high energy astrophysical phenomena such as Gamma-Ray Bursts (GRBs) and Active Galactic Nuclei (AGNs), Theories of Gravity, General Relativity and its Mathematical Foundation, Black Holes, Dark matter and Early Universe Cosmology. There was also a workshop on "Data Science and Machine Learning in Relative Astrophysics"

Website : <https://indico.icranet.org/event/2/>

Youtube : <https://www.youtube.com/watch?v=6nM0WwpawdM&t=790s>

E-NewsLetter : <https://english.iut.ac.ir/node/600>

• *Organizing a parallel session in 16th Marcel Grossmann virtual Meeting (MG16) 5-10 July 2021*

Chair of a Parallel session (DM4)

In collaboration with Prof. She-Sheng Xue, I have organized a parallel session in MG16 titled "Dark Matter Searches with Liquid Xenon and Argon Detectors". In this session which was held on Wednesday 7th July, by inviting several scientists including some from XENON1T experiment, we discussed possible signatures of different sub-GeV dark matter candidates within current and future LXe/LAr detectors. We had presentations of recent results, ongoing efforts and theoretical attempts in the next generation of XENON detectors such as XENONnT, LZ, PandaX-II and Darwin. We talked about the XENON1T new observation on low-energy excess in electronic recoils and possible requirement for further confirmation with more precise future instruments. Both contributions on experimental and theoretical efforts were presented.

Website : <https://indico.icranet.org/event/1/sessions/8/#20210707>

Youtube : <https://www.youtube.com/watch?v=H9oGYnGq9pI&t=161s>

• *Organizing a virtual meeting on the occasion of World Astronomy Week, May 11-12, 2021*

Chair of Organizing Committee

International Astronomy Week is an annual event intends to inform students and general audience about Astronomy and Astrophysics, and to provide an active atmosphere for professionals, scholars and students to interact and exchange new ideas of the fields. We have organized this event in ICRANet-Isfahan. Due to the pandemic issue, the meeting was held via remote virtual meeting stuff and this gave us the opportunity to get together virtually from Italy and Iran to have a fruitful meeting.

• *Within ICRANet - Oral Talks*

Soroush Shakeri, She-Sheng Xue **17th Italian-Korean Symposium for Relativistic Astrophysics**, 5th Agust 2021, The Role of Sterile Neutrinos in Cosmology and recent anomalies in Dark Matter Searches.

Link : <http://45.120.69.181/plan.php/kis2021/3445>

<https://drive.google.com/file/d/1p7XiH9evqCoB1Z2MSP63x6V1F-Onjgkt/view>

Soroush Shakeri, She-Sheng Xue, **Sixteenth Marcel Grossmann Meeting (MG16)**, 7th July 2021, Hunt for the Sterile Neutrino Dark Matter.

Link : <https://indico.icranet.org/event/1/contributions/993/attachments/244/367/Finalpresentation>.

pdf

•*Outside ICRANet - Oral Talks*

Soroush Shakeri, IRCHEP 1400, Iranian Conference on High Energy Physics
Deciphering the Universe Ciphers, School of Physics, **The Role of Sterile Neutrinos
in Recent Observed Anomalies**, IPM 8-10 November, 2021

Link : <http://physics.ipm.ac.ir/conferences/irchep/note/S.Shakeri.pdf>

Soroush Shakeri, **Direct and Indirect Probes for Dark Matter**: from Recoil Electrons
to Gravitational Waves, Weekly Meeting, IPM, 17 November

/ <https://indico.particles.ipm.ir/indico/event/445>

Neutron Stars as dark matter probes, V. Sagun, O. Ivanytskyi, I. Lopez, D. R.

Karkevandi, S. Shakeri, Sep 27 – 30, 2021 Yerevan, Armenia

*[https://indico.cern.ch/event/1046655/contributions/4535145/attachments/2321226/3952727/
Sagun2021.pdf](https://indico.cern.ch/event/1046655/contributions/4535145/attachments/2321226/3952727/Sagun2021.pdf)*

/ <https://indico.cern.ch/event/1046655/contributions/4535145>

•*Outside ICRANet - Teaching Activities*

Analytic Mechanics I, II. Astrophysics, Particle Physics, Isfahan University of Technology

•*Outside ICRANet -Research experience*

Reviewer of Iranian Journal of Research on Many Body Systems.

Reviewer of Articles in Iranian National conference of Gravity and Cosmology 1400.

Reviewer of Proposals in Khwarizmi Youth Award.

Reviewer of Articles in Iranian Conference on Mathematical Physics Conference.

• *Scientific Proposals Within ICRANet*

• Detectability of GRB Optical Prompt and Afterglow with Iranian National
Observatory (INO340) - ICRANet-Italy & ICRANet-Isfahan

• Probing Dark Matter with Neutron Stars - ICRANet-Italy & ICRANet-Isfahan

•*Work in Progress*

Bosonic Dark Matter in light of the NICER Precise Radius Measurements,

Soroush Shakeri, Davood Rafiei Karkevandi, et al. 2022

Probing Axions via Light Circular Polarization and Event Horizon Telescope,

Soroush Shakeri and Fazlollah Hajkarim, 2022

Relic Density of Sterile Neutrinos, Somayyeh Mahmoudi, Soroush Shakeri and She-
Sheng Xue, 2022

Search for Sterile Neutrinos at MiniBooNE Experiment, Soroush Shakeri, Sina
Etebar, She-Sheng Xue, Fazlollah Hajkarim, 2022

•*Diploma thesis supervision*

Sina Etebar, *The Role of Sterile Neutrinos to Explain Various Anomalies Observed in Neutrino Oscillation
Experiments*, 2021

Hanieh Karimi, *Dark Matter Effects in Neutron Star Properties*, 2021

List of Publications Within ICRANet before 2021

Nonlinear QED Effects in X-ray Emission of Pulsars , S. Shakeri, M. Haghighat and She-Sheng
Xue,

JCAP 1710 (2017) no.10, 014 , [arXiv:1704.04750]

Polarization of a Probe Laser Beam due to the Nonlinear QED Effects. Soroush Shakeri, Seyed
Zafarollah Kalantari, She-Sheng Xue. 2017. 10 pp. Published in Phys.Rev. A95 (2017) no.1, 012108.

"On the universal late X-ray emission of binary-driven hypernovae and its possible collimation" G.B.

Pisani, R. Ruffini, Y. Aimuraton, C.L. Bianco, M. Kovacevic, R. Moradi, M. Muccino, A.V. Penacchioni, J.A. Rueda, S. Shakeri Y. Wang. *Astrophys.J.* 833 (2016) no.2, 159 [arXiv:1610.05619]

"X-ray Flares in Early Gamma-ray Burst Afterglow" R. Ruffini, Y. Wang, Y. Aimuraton, L. Becerra, C.L. Bianco, M. Karlica, M. Kovacevic, L. Li, J.D. Melon Fuksman, R. Moradi, M. Muccino, A.V. Penacchioni, G.B. Pisani, D. Primorac, J.A. Rueda, S. Shakeri, G.V. Vereshchagin, S.-S. Xue, *Astrophys.J.* 852 (2018) no.1, 53 [arXiv:1704.03821]

The binary systems associated with short and long gamma-ray bursts and their detectability, Jorge Rueda, Y. Aimuraton, U. Barres de Almeida, L. Becerra, C.L. Bianco, C. Cherubini, S. Filippi, M. Karlica, M. Kovacevic, J.D. Melon Fuksman, R. Moradi, M. Muccino, A.V. Penacchioni, G.B. Pisani, D. Primorac, R. Ruffini, N. Sahakyan, S. Shakeri, Y. Wang. *Int.J.Mod.Phys. D26* (2017) no.09, 1730016

The cosmic matrix in the 50th anniversary of relativistic astrophysics, R. Ruffini, Y. Aimuraton, L. Becerra, C.L. Bianco, M. Karlica, M. Kovacevic, J.D. Melon Fuksman, R. Moradi, M. Muccino, A.V. Penacchioni, G.B. Pisani, D. Primorac, J.A. Rueda, S. Shakeri, G.V. Vereshchagin, Y. Wang, S.S. Xue, *Int.J.Mod.Phys. D26* (2017) no.10, 1730019

What can we learn from GRBs? Marco Muccino, Remo Ruffini, Yerlan Aimuraton, Laura M. Becerra, Carlo L. Bianco, Mile Karlica, Milos Kovacevic, Julio D. Melon Fuksman, Rahim Moradi, Ana V. Penacchioni, Giovanni B. Pisani, Daria Primorac, Jorge A. Rueda, Soroush Shakeri, Gregory V. Vereshchagin, She-Sheng Xue, Yu Wang *EPJ Web Conf.* 168 (2018) 01015

Revisiting the Statistics of X-ray Flares in Gamma-ray Bursts, Y. Wang, Y. Aimuraton, R. Moradi, M. Peresano, R. Ruffini, S. Shakeri, THESEUS Workshop 2017, 05-06 Oct 2017. Naples, Italy [arXiv: 1802.01693]

Relativistic Behavior and Equitemporal Surfaces in Ultra-Relativistic Prompt Emission Phase of Gamma-Ray Bursts, Moradi, R.; Ruffini, R.; Bianco, C. L.; Chen, Y.-C.; Karlica, M.; Melon Fuksman, J. D.; Primorac, D.; Rueda, J. A.; Shakeri, S.; Wang, Y.; Xue, S. S. *Astronomy Reports, Volume 62, Issue 12, pp.905-910, 2018*

List of Publications Outside ICRANet before 2021

Circularly Polarized EM Radiation from GW Binary Sources. Soroush Shakeri, Alireza Allahyari, Published in *JCAP*11(2018)042, [arXiv:1808.05210]

Schwinger Effect in Anisotropic Inflation, Soroush Shakeri, Mohammad Ali Gorji and Hassan Firouzjahi, [arXiv:1903.05310] *Phys. Rev. D* 99, 103525 (2019)

Sergio Torres



Position: Researcher
Centro Internacional de Física, Bogotá, Colombia
Period covered: 2016

I Scientific Work

Leading a research group studying cosmological models and analysis of cosmic background radiation data; Principal investigator (1995) of the Galactic Emission Mapping (GEM) project in Colombia, consisting of an international collaboration to survey the galactic radiation in the 408 – 5000 MHz range.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

Cosmology Workshop, Universidad Nacional de Colombia, Bogotá, Colombia

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

Dynamical Astronomy in Latin America - ADeLA, Universidad de los Andes, Bogotá, September 28-30, 2016

Other 2016 List of Publication

S. Torres, O. Restrepo, J. C. Cuervo, G. Chaparro, Analysis of Anisotropy in the Hubble Flow, *TECCIENCIA*, 2016

Chaparro Molano G., Restrepo Gaitan O. A., Cuervo J. C., and Torres S., "Bayesian Estimation of Uncertainties for Redshift Independent Distance Measurements in the NED-D Catalog", *Dynamical Astronomy in Latin America - ADeLA*, Universidad de los Andes, Bogotá, September 28-30, 2016

Personal Details

Name: Donato Giorgio Torrieri

Date of birth: 30 may 1975 (Moscow, Russia)

Nationality: Italian

Permanent resident of the US (Green card) since april 2012

Permanent resident of Brazil (VIPER) since february 2014

Contact details

G. Torrieri,

Departamento de Raios Cosmicos e Cronologia

Instituto de Fisica Gleb Wataghin Av. Sergio Barque de Holanda, 777

Cidade Universitaria Zeferino Vaz Baro Geraldo CEP 13083-859 - Campinas SP, Brazil

Tel. +551935215548

email: torrieri@i_.unicamp.br

Current occupation

Professor (Professor Doutor),

Departamento de Raios Cosmicos e Cronologia

Instituto de Fisica Gleb Wataghin

State University of Campinas, Campinas, Brazil

YUNLONG ZHENG

Position: Visiting scholar

Period covered: 9 JULY, 2021-9 JULY,2022



I Scientific Work

We have studied the universe, especially nonsingular universe including bounce cosmology and emergent universe. The work on Bounce cosmology, published as JCAP 11 (2021) 045, have investigated the scalar and tensor perturbations in DHOST Bounce Cosmology. The other work on emergent universe JHEP 11 (2021) 163 improved our previous work JHEP 01 (2021) 141 on DHOST genesis.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRA Net (e.g. teaching activities, conferences etc...) and outside ICRA Net (teaching activities in your university etc...)*]

III a. Within ICRA Net

III b. Outside ICRA Net

IV. Other

2021 List of Publication (* stands for corresponding author)

1. Mian Zhu, Amara Ilyas, **Yunlong Zheng***, Yi-Fu Cai*, Emmanuel N.Saridakis*, Scalar and Tensor Perturbations in DHOST Bounce Cosmology, JCAP 11 (2021) 045
2. Mian Zhu, **Yunlong Zheng***, Improved DHOST Genesis , JHEP 11 (2021) 163
3. Amara Ilyas[#], Mian Zhu[#], **Yunlong Zheng***, Yi-Fu Cai*, Emergent Universe and Genesis from the DHOST Cosmology, JHEP 01 (2021) 141

O

International Relativistic Astrophysics Ph. D.

ARGÜELLES CARLOS RAÚL



Position: ICRANet Adjunct professor of the Faculty; Researcher (permanent position) at CONICET (IALP-UNLP)– Argentina
Period covered: 2021

I Scientific Work

Theoretical and phenomenological aspects of particle Dark Matter, self-gravitating systems, Numerical Relativity, Galactic Dynamics, Cosmology, Neutrino Physics beyond standard model.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Invited speaker at the IFT seminars at UAM, Madrid - (Online Meeting), April 22, 2021

Invited Plenary speaker and member of the International Coordinating Committee at the 16th Marcel Grossmann Meeting MG16 – Rome, Italy, July 5 –10, 2021

Invited parallel session speaker (DM 1) and at the 16th Marcel Grossmann Meeting MG16 – Rome, Italy, July 5 –10, 2021

Invited round table speaker together with the Nobel Prize in Physics 2020, at the 16th Marcel Grossmann Meeting MG16 – Rome, Italy, July 5 –10, 2021

Invited speaker at the 17th Italian-Korean Symposium for Relativistic Astrophysics - (Online Meeting), August 02 –06, 2021

Invited speaker at the first ICRANet-ISFAHAN Astronomy Meeting: From the Ancient Persian Astronomy to Recent Developments in Theoretical and Experimental Physics, Astrophysics and General Relativity - (Online Meeting), November 03 –05, 2021

Invited Seminar speaker at the Observatoire astronomique de Strasbourg, France - November 03, 2021

II b Work With Students

Master in Science Thesis supervisor of two graduate students from Argentina (Ms. Valentina Crespi –UNLP, and Ms. Carolina Millauro - UBA). Area: Physics. Period 2021.

II c Diploma thesis supervision

Ph.D Thesis director of Dr. Rafael Yunis - IRAP Ph.D. 16TH CICLE (La Sapienza Università di Roma).

Ph.D Thesis director of Mr. Santiago Collazo – Beca doctoral CONICET, Argentina.

II d Other Teaching Duties

Assistant Professor position in Theoretical Physics at La Plata National University (UNLP – Physics department)

II e. Work With Postdocs

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

Adjunct professor of the Faculty. Scientific collaborator with the Astroparticle Physics and Dark Matter group.

III b. Outside ICRANet

Researcher (permanent position) at CONICET – Argentina. Working place: IALP - UNLP, La Plata, Argentina. Paseo del Bosque, Casco Urbano, B1900FWA La Plata, Buenos Aires. Phone: +54 0221 4236593 Int. 1052. Teaching activities as Assistant Professor at UNLP. Master in Science Thesis advisor and Ph.D thesis advisor.

IV. Other

2021 List of Publication

- 1- Becerra-Vergara, E. A.; Argüelles, C. R.; Krut, A.; Rueda, J. A.; Ruffini, R., “Hinting a dark matter nature of Sgr A* via the S-stars”, Monthly Notices of the Royal Astronomical Society 505 (2021), issue 1, pp L64-L68.
- 2- Argüelles, Carlos R.; Mestre, M. F.; Becerra-Vergara, E. A.; Crespi, V.; Krut, A.; Rueda, J. A.; Ruffini, R., “What does lie at the Milky Way centre? Insights from the S2 star orbit precession”, Monthly Notices of the Royal Astronomical Society, accepted for publication (2021), doi:10.1093/mnrasl/slab126.

- 3-** Argüelles, Carlos R.; Díaz, Manuel I.; Krut, Andreas; Yunis, Rafael, “On the formation and stability of fermionic dark matter halos in a cosmological framework”, *Monthly Notices of the Royal Astronomical Society*, 502 (2021), issue 3, pp 4227-4246.
- 4-** Yunis, R. I; Argüelles, C. R., Scóccola, C. G.; Nacir, D. L.; Giordano, G. “Self Interactions in Warm Dark Matter: A View from Cosmological Perturbation Theory”, *Astronomy Reports* 65 (2021) issue 10, pp 1068-1073.

Becerra Bayona Laura Marcela

Position: Adjunct professor
Period covered: 2021-present



I Scientific Work

I have worked on the Induced Gravitational Collapse (IGC) paradigm in which a carbon-oxygen core explodes in a Type Ib/c supernovae in presence of a close neutron star companion. The supernovae triggers a hypercritical accretion into the neutron star and depending of the initial binary parameters the system can have different fates. In a first scenario, also referred as binary-driven hypernova (BdHNe), the binary is enough bound, so the accretion rate to NS allows it to reach its critical mass, and collapse to a black hole with a GRB emission. A second scenario can happen for binary systems with larger binary separations, then the hypercritical accretion onto the NS is not sufficient to induce its gravitational collapse. Instead of a GRB emission, a X-ray flash (XRF) is produced. I have worked on the hypercritical accretion process, following the evolution of the NS, in order to characterize the observational signatures in each scenario.

I have also worked on the evolution of postmergers remnants of white dwarfs binary systems. The simulations of coalescence between white dwarfs have shown that the final result consists of a central remnant made of the undisturbed primary star. The secondary star is totally disrupted and about half of the material is accreted by the primary, forming a hot corona surrounding it, and the rest of the material forms a rapidly rotating Keplerian disk, since little mass is ejected from the system during the coalescence process. I have modelled the evolution of this last system, exploring the different initial conditions that allow the white dwarfs to collapse to a neutron star or explode as a Type Ia supernovae.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- *IRAP Ph.D. Erasmus Mundus Workshop*, Supernovae, Gamma-ray bursts and the induced gravitational collapse, May 11th–16th, 2014 Les Houches (France). Assistant.
- *1st Scientific ICRANet Meeting in Armenia*: Black Holes: the largest energy sources in the Universe, June 30th –July 4th, 2014. Yerevan, Armenia. Assistant
- Third Bego Rencontres. IRAP Ph.D. Erasmus Mundus school. September 8th-19th, 2014. “Hypercritical Accretion in Binary-Driven Hypernova”. L. Becerra, J. Rueda and R. Ruffini
- Conference Swift 10 Years of Discovery. Rome, Italy. December 1st-5th, 2014. “Hypercritical Accretion, Induced Gravitational Collapse, and Binary-Driven Hypernova”. L. Becerra, et. al.
- The Second ICRANet César Lattes Meeting. Rio de Janeiro, Brasil. April 13rd-18th, 2015. “Angular Momentum Transfer During the Hypercritical Accretion in Binary-Driven-Hypernova” L. Becerra, F. Cippolletta, F. Fryer, J. Rueda and R. Ruffini.
- Fourteenth Marcel Grossmann Meeting – MG14. Rome, Italy. July 12nd-18th, 2015:
 1. “Angular Momentum Transfer Role in the Hypercritical Accretion of Binary-Driven-Hypernova” L. Becerra, F. Cippolletta, F. Fryer, J. Rueda and R. Ruffini.
 2. “Induced compression by angular momentum loss in fast rotating, magnetized Super-Chandrasekhar white dwarfs” L. Becerra, E. Garcia-Berro, P. Loren-Aguilar and J. Rueda

- Supernovae, Hypernovae and Binary Driven Hypernovae. An Adriatic Workshop. Pescara, Italy. July 20-30, 2016:
 1. “The spin evolution of fast rotating, magnetized super-Chandrasekhar white dwarfs in the aftermath of white dwarfs mergers” L. Becerra, E. Garcia-Berro, P. Loren-Aguilar and J. Rueda.
 2. “On the induced gravitational collapse scenario of gamma-ray bursts associated with supernova”. L. Becerra, C. L. Biando, C. Fryer, J.A. Rueda, R. Ruffini.
- XV Latin American Regional IAU Meeting (LARIM). Cartagena, Colombia. October 3-7/2016. “Hypercritical Accretion in the Induced Gravitational Collapse” L. Becerra, C. L. Biando, C. Fryer, J.A. Rueda, R. Ruffini.
- The 2017 Annual meeting of the Division of Gravitation and Relativistic Astrophysics of the Chinese Physical Society - Fifth Galileo-Xu Guangqai Meeting. Chengdu, China. June 25-30, 2017. “SPH simulations of the induced gravitational collapse scenario”. L. Becerra, C. L. Bianco, F. Fryer, J. A. Rueda and R. Ruffini
- International Conference on Gravitation: Joint Conference of ICGAC-XIII and IK15. Seoul, Korea. July 3-7, 2017. “On the induced gravitational collapse”. L. Becerra, C. L. Bianco, F. Fryer, J. A. Rueda and R. Ruffini.
- THESEUS (Transient High Energy Sky and Early Universe Surveyor) Workshop, Naples, Italy. October 5-6, 2017. “On the induced gravitational collapse scenario”. L. Becerra, C. L. Bianco, F. Fryer, J. A. Rueda and R. Ruffini.

2021 List of Publication

- L. Becerra, A. Reisenegger, J. Alejandro Valdivia, and M. E. Gusakov. Evolution of random initial magnetic fields in stably stratified and barotropic stars. arXiv e-prints, page arXiv:2111.10673, Nov. 2021, 2111.10673.
- R. Ruffini, R. Moradi, J. A. Rueda, L. Li, N. Sahakyan, Y. C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B. Pisani, and S. S. Xue. The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs. Mon. Not. Roy. Astr. Soc., 504(4):5301–5326, July 2021, arXiv: 2103.09142.

Becerra Vergara, Eduar Antonio

Position: Ph.D. Student

Period covered: 2018 - present



I Scientific Work

In the development of the Ph.D., my main research field focuses in dark matter, more precisely, I have studied the physics of self-gravitating objects formed by fermionic dark matter, as well as the orbits of massive particles, in the field of general relativity, in the space-time generated by such objects. My main field of work on this topic has been the study of stellar dynamics around the Galactic Center, especially the cluster of stars S, assuming a quantum nature of Sgr A*, i.e, we propose in the Milky Way center a dense quantum core of dark matter and we study the gravitational effects on the orbit and velocity of the stars around it contrasting the results with observational data.

Another field in which my work focuses is the creation, emission, and annihilation of neutrinos-antineutrinos pairs around compact objects under the model of induced gravitational collapse (IGC) and their connection with the generation of long-duration gamma-ray bursts (LGRBs). I have been studying the neutrino-antineutrino annihilation rate as well as the energy deposition and their influence on the luminosity of LGRBs.

I have also dabbled in the study of other exotic astrophysical objects such as neutron stars and quark stars. Mainly I have studied the effects of anisotropy on mass-radius diagrams and the resulting maximum mass using an interacting quark equation of state. This anisotropy is generated as the difference between the radial and the tangential pressure in the hydrostatic equilibrium equation which is obtained by solving the Einstein field equations in the interior of a star. Additionally, I have worked into other fields of astrophysical interest as the stability of static axisymmetric relativistic thin disks in general relativity, by introducing a first-order perturbation into the energy-momentum tensor of the fluid in order to characterize astrophysically relevant galactic or accretion disks models.

II Conferences and educational activities

II a - Conferences and Other External Scientific Work

- Sixteenth Marcel Grossmann Meeting - MG16, On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories. Virtual Meeting - July 5-10, 2021. Roundtable (Reinhard Genzel, Carlos Argüelles, Andreas Krut, Jorge Rueda and Eduar Becerra): What is in our Galactic center. *Speaker*
- The Fourth Zeldovich virtual meeting – September 7 to 11, 2020. *Assistant*

- 6th Italian-Korean Symposium on Relativistic Astrophysics – July 1 to 5, 2019. *Assistant*
- Open Universe International Doctoral School "The discovery of BlackHoles" How the discovery of a Black Hole in GRB 190114C and in M87 is modifying the human outlook from planet Earth. – June 10 to 14th, 2019 in ICRANet Seat at Villa Ratti – Nice (France). Talk: *The geodesics motion of S2 and G2 as a test of the fermion dark matter constituency of our galactic core.*
- XXIV Iberoamerican Congress of Catalysis, Medellin - Colombia, September 15 to 19th, 2014. Talk: *Influence of the support and the ratio Co/(Co+Mo) in the selectivity HDS/HIDO of catalysts for FCC naphtha HDT.*
- XXIII Iberoamerican Congress of Catalysis, Santa Fe - Argentina, September 2 to 7th, 2012. Talk: *Study of effect the inhibition by aromatic compounds on the hydrodesulfurization reaction of dibenzothiophene.*
- XXVI Colombian Congress of Chemical Engineering, Barrancabermeja - Colombia, September 1 to 4th, 2011. Talk: *Inuence of aromatics and temperature on the desulfurization of a heavy cut for diesel production.*

II b - Seminars

- Universidad de Salamanca, Grupo de Gravitación y Cosmología Relativista - Salamanca, España. *Seminary: Materia oscura y la dinámica estelar alrededor de Sgr A*. Invited speaker*
- Probing the effect of background fields on the polarization of photons from CMB to lasers, November 15th, Pescara, Italia. *Assistant*
- Quantum-systems investigations vs optical-systems ones, November 7th, Pescara, Italia. *Assistant*
- Magnetars, Magnetized Black Holes and Laboratory Astrophysics, September 12th, Pescara, Italia. *Assistant*
- Higgs inflation with a running kinetic term, June 25th, Pescara, Italia. *Assistant*
- Technical Project Management with Standard PMI, October – November, 2011. *Assistant*

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

- Lecturer. March 2015 to July 2018. Lecture: *Waves and particles*. Physics Department, Universidad Industrial de Santander – UIS.

- Lecturer. February to July 2016. Lectures: *Differential Calculus*. Basic Science Department, Universidad Santo Tomas.
- Lecturer. February to July 2016. Lectures: *Mathematics with applications in economics*. Basic Science Department, Universidad Santo Tomas.
- Lecturer. November 2013 - September 2014. Lecture: *Transport phenomena*. Physics Department, Universidad Industrial de Santander – UIS.

List of Publication

- C. R. Argüelles, M. F. Mestre, E. A. Becerra-Vergara, V. Crespi, A. Krut, J. A. Rueda and R. Ruffini. *What does lie at the Milky Way centre? Insights from the S2 star orbit precession*, MNRAS Letters (2021).
- C. R. Argüelles, E. A. Becerra-Vergara, J. A. Rueda and R. Ruffini. *Reshaping our understanding on structure formation with the quantum nature of the dark matter*, IJMPD, 2230002 (2021).
- E. A. Becerra-Vergara, C. R. Argüelles, A. Krut, J. A. Rueda and R. Ruffini. *Hinting a dark matter nature of Sgr A* via the S-stars*, MNRAS: Letters 505 (1), L64-L68 (2021).
- J. D. Uribe, E. A. Becerra-Vergara and J. A. Rueda, *Neutrino Oscillations in Neutrino-Dominated Accretion Around Rotating Black Holes*, Universe 7 (1), 7 (2021).
- E. A. Becerra-Vergara, J. A. Rueda, and R. Ruffini, *A test of the fermion dark matter of the supermassive compact object at the center of our galaxy*, Astro. Nachr. 342: 388–393 (2021).
- E. A. Becerra-Vergara, C. R. Argüelles, A. Krut, J. A. Rueda, and R. Ruffini, *The geodesic motion of S2 and G2 as a test of the fermion dark matter constituency of our galactic core*, A&A, 641, A34 (2020).
- E. A. Becerra-Vergara, Sindy Mojica, F. D. Lora-Clavijo, and Alejandro Cruz-Osorio, *Anisotropic quark stars with an interacting quark equation of state*, Phys. Rev. D 100, 103006 (2019).
- E. A. Becerra-Vergara, F. L. Dubeibe, and G. A. González, *On the influence of the mass definition in the stability of axisymmetric relativistic thin disks*, Rev. Acad. Colomb. Cienc. Ex. Fis. Nat. D 41(158), 22-29 (2017).

Patents

- E. A. Becerra-Vergara, M. P. Ramirez, D. J. Pérez-Martínez, S. A. Giraldo, *Catalizador soportado en aluminosilicato amorfo (asa) para la remoción selectiva de azufre de naftas y método de fabricación del mismo*, Colombia NC2017/0007866 (2020).

Lecian Orchidea Maria



Position:

Professor Sapienza University of Rome,
Faculty of Medicine and Pharmacy,
Viale Regina Elena, 324- 00185 Rome, Italy.

Professor Sapienza University of Rome,
Faculty of Medicine and Dentistry, Piazzale Aldo Moro, 5- 00185 Rome, Italy.

Period covered: 2021

I Scientific Work

Research in Theoretical Physics and Mathematics.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Conferences- Contributed Talks

September 25-26, 2021, Global Webinar on Laser, Optics and Photonics, Bangalore, India, online; Contribution: New developments of the Optical equivalence Theorem and applications.

September 22-23, 2021: European Lasers, Photonics and Optics Technologies Summit-

Elos 2021, theme 'Multifaceted aspects of Lasers, Photonics and Optics technologies', Paris, France, virtual event; Contribution: Developments and applications of the optical equivalence theorem.

July 5-11 2021: 24th International Workshop What Comes Beyond the Standard Models?, Bled, Slovenia; Contribution: Statistical analyses of antimatter domains, created by nonhomogeneous baryosynthesis in a baryon asymmetrical Universe, Bled, Slovenia.

February 22-28 2021: 1st Electronic Conference on Universe- S8. The Universe of Andrei Sakharov, Bled, Slovenia; Contribution: Studies of baryon-antibaryon annihilation in the evolution of antimatter domains in baryon-asymmetric Universe, online.

Conferences

18 October 2021: International Society for Quantum Gravity Town Hall Meeting, online.

5-7 October 2021: First International Society for Quantum Gravity ISQG Workshop, online.

8-13 Aug 2021: Symmetry 2021 - The 3rd International Conference on Symmetry, online.

5-9 July 2021: Sixteenth Marcel Grossmann Meeting on General Relativity, Virtual Meeting.

29-30 March 2021: Workshop on philosophy of dark matter, University of Wuppertal, Wuppertal, Germany.

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

Professor- Fundamentals of Mathematics

Faculty of Medicine and Pharmacy,

Sapienza University of Rome, Viale Regina Elena, 324- 00185 Rome, Italy.

Professor- Applied Physics

Faculty of Medicine and Dentistry, Sapienza University of Rome,

Piazzale Aldo Moro, 5- 00185 Rome, Italy.

II e. Work With Postdocs

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

III b. Outside ICRANet

Conference Organization

International Scientific Committees 2021 3rd International Conference on Computer, Communications and Mechatronics Engineering (CCME2021) December 17-18, 2021, Xiamen, China.

*Organizing Committee Member Physics and Astronomy
World Forum; Theme: Advancing the Frontiers of Physics Knowledge to Explore the Dynamics of Astronomy 02-04 December 2021, Frankfurt, Germany.*

*Organizing Committee Member 8th Edition of
Global Conference on Catalysis, Chemical Engineering and Technology-Catalysis 2021
27-29 September 2021, Paris, France.*

*Program Chair Technical Committee
Member Editor
2021 International Conference on Energy, Environment, Epidemiology and Information System (IC3EIS2021)
26-27 September 2021, Beijing, China.*

*Scientific board Global Conference
on Physics (Physics-2021); Theme: Exploring the Innovations and Modern Break Troughs in the eld of Physics
13-15 September 2021, Brussels, Belgium.*

*Scientific Board Global Conference
on Biomedical Engineering and Systems; Theme: Reshaping Technology Priorities in the Wake of Pandemic 22-24 July 2021,
Barcelona, Spain.*

*TPC Member Reviewer
2021 International Workshop on Environmental Science and Renewable Energy Engineering (ESREE2021)
April 11-12 2021, Beijing, China.*

*TPC member 2021 6th
International Conference on Education Reform and Modern Management (ERMM2021) 11-12 April 2021,
Beijing, China.*

*Organizing Committee Member Geoscience 2021- 6th
International Conference on Geology and Earth Science March 30, 2021, Virtual Conference.*

*General Chair and Editor 2021 6th
International Conference on Green Materials and Environmental Engineering (GMEE2021)
2-3 February 2021, Changsha, China.*

Editor Activity

*Associate Editor Open
Access Journal of Engineering Sciences.*

*Editorial Board Committee
of Physics and Advanced Applications.*

JPAA- Journal

*Editorial Board Member
Mechanical Engineering (2018-ongoing).
(2017-ongoing).*

*SCIREA Journal of
The Open Conference Proceedings Journal*

Guest Editor

Galaxies MDPI

Referee Activity

ESREE2021- 2021 International Workshop on Environmental Science and Renewable Energy Engineering .

Asia-Pacific Conference on Applied Mathematics and Statistics 2022 (AMS 2022).

2021 3rd International Conference on Computer, Communications and Mechatronics Engineering (CCME2021).

2021 5th International Conference on Electrical, Automation and Mechanical Engineering (EAME2021).

2021 6th International Conference on Green Materials and Environmental Engineering (GMEE2021).

2022 7th International Conference on Green Materials and Environmental Engineering (GMEE2022).

Asian Journal of Research and Reviews in Physics.

Journal of Applied Chemical Science International.

Physical Science International Journal.

Current Journal of Applied Science and Technology.

Fractal MDPI

Encyclopedia MDPI

Particles MDPI

Mathematics MDPI

IV. Other

Research Consortia:

The String Theory Universe COST Action - European Cooperation in Science and Technology.

e-CA COST Action CANTATA Cosmology and Astrophysics Network for Theoretical Advances and Training e-Actions (CA15117).

ISQG- International Society for Quantum Gravity.

2021 List of Publication

M.Yu. Khlopov, OML, Statistical analyses of antimatter domains, created by nonhomogeneous baryosynthesis in a baryon asymmetrical Universe, Proceedings of 24th Workshop on What Comes Beyond the Standard Models?, BLED WORKSHOPS IN PHYSICS VOL. 22, NO. 1, 161.

OML, M.Yu. Khlopov, Analyses of Specific Aspects of the Evolution of Antimatter Glubular Clusters Domains, Astron.Rep. 65 (2021) 10, 967-972.

Maxim Y. Khlopov; OML, Baryon-Antibaryon Annihilation in the Evolution of Antimatter Domains in Baryon-Asymmetric Universe, Universe 7 (2021) 9, 347.

A.A. Kirillov, E.P. Savelova OML, On generation of a stochastic GW background by the scattering on relic wormholes, Eur.Phys.J.C 81 (2021) 3, 263.

Maxim Yu. Khlopov, OML, Effects of Baryon-Antibaryon Annihilation in the Evolution of Antimatter Domains in Baryon Asymmetrical Universe, Physical Sciences Forum 2 (2021) 1, 31.

Lobato Ronaldo

Position: IRAP PhD student
Period covered: 2016-2019

Position: Collaborator
Period covered: 2019-2021



I Scientific Work

Relativistic astrophysics:

Electromagnetic emission mechanisms of white dwarfs and neutron stars, with Profs: Manuel Malheiro, Jorge A. Rueda, Jaziel Coelho and Remo Ruffini.

Structure and evolution of white dwarfs, with Profs: Jorge A. Rueda, Edson Otoniel and Manuel Malheiro and Geanderson Carvalho.

Gravitation:

Higher-dimensional and alternatives theories of gravity, with Drs: Pedro Moraes, José Domingo and Geanderson Carvalho

Nuclear physics:

Nuclear structure, many-body physics and few-body physics, with Prof. Carlos A. Bertulani, Dr. Emanuel Chimanski, Profa Neelima Kelkart and Prof. Marek Nowakowski

Machine Learning:

Supervised and unsupervised machine learning techniques and big data applied to Astrophysics and Nuclear Physics, with Dr. Emanuel Chimanski.

II Conferences and educational activities

- Black holes and exotic compact objects
- Numerical relativity modelling of sources of gravitational waves
- Exploring black hole physics with numerical relativity
- II Latin American Strategy Forum for Research Infrastructure: an Open Symposium for HECAP
- Quantum spacetime and the Renormalization Group
- Mathematical and Computational Approaches for Solving the Source-Free Einstein Field Equations
- INT Virtual Workshop: Renormalization Group Approaches to the Many-Body Problem
- 3rd South American Dark Matter Workshop
- Workshop on New Trends in Dark Matter
- 1st International Meeting of Theoretical and Applied Physics
- Alternative Gravities and Fundamental Cosmology
- Neutron stars as multi-messenger laboratories for dense matter

- Modification of Gravity: Theories and Observations
- Nuclear Physics meets Condensed Matter: symmetry, topology and gauge
- Probing Nuclear Physics with Neutron Star Mergers
- XV International Workshop on Hadron Physics
- XLIV Brazilian Workshop on Nuclear Physics
- Detection and Analysis of Gravitational Waves in the era of Multi-Messenger Astronomy: From Mathematical Modelling to Machine Learning (21w5066)

II b Work With Students

2021–. Benjamin Santoyo, Machine learning application in astrophysics, Masters’ physics program, Texas A&M University - Commerce, Texas, US. Co-advisor with Dr. Carlos Bertulani

2021-2021. Brennen Johnson, Equation of state for compact stars, Research Experiences for Undergraduates (REU), Texas A&M University - Commerce, Texas, US. Co-advisor with Dr. Carlos Bertulani

2021 List of Publication

- General approach to the Lagrangian ambiguity in $f(R, T)$ gravity. *Eur. Phys. J. C* **81**, 134 (2021). <https://doi.org/10.1140/epjc/s10052-021-08920-4>
- Final state interaction in the pn and nn decay channels of ^4He . *Eur. Phys. J. A* **57**, 67 (2021). <https://doi.org/10.1140/epja/s10050-021-00390-2>
- Neutron diffusion in magnetars as a source of astrophysical bursts. arXiv preprint arXiv:2112.14817
- Neutron Tunneling: A New Mechanism to Power Explosive Phenomena in Neutron Stars, Magnetars, and Neutron Star Mergers. 2021 *ApJ* 912 105. <https://doi.org/10.3847/1538-4357/abf141>
- Neutron stars in $f(R, L_m)$ gravity with realistic equations of state: joint-constrains with GW170817, massive pulsars, and the PSR J0030+0451 mass-radius from *NICER* data. *Eur. Phys. J. C* **81**, 1013 (2021). <https://doi.org/10.1140/epjc/s10052-021-09785-3>

Moradi Rahim

Position: **Faculty member of ICRANet**

Period covered: **2019-**

I Scientific Work

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- **Chair of parallel session; Sixteenth Marcel Grossmann Meeting 5-10 July 2021**
- **Program Committee; The 17th Italian-Korean Symposium for Relativistic Astrophysics August 02, 2021 – August 06, 2021**
- **Invited plenary talk; Sixteenth Marcel Grossmann Meeting 5-10 July 2021 Talk title: GRB-SN association**
- **Member of Organizing Committee; ICRANet-ISFAHAN Astronomy Meeting 3-5 Nov 2021**
- **Workshop on Deep learning in Astronomy:ICRANet-ISFAHAN Astronomy Meeting 4 Nov 2021**

II b Work With Students

1. Deep Learning in Searching the Spectroscopic Redshift of Quasars. F. RastegarNia, M. T. Mirtorabi, R. Moradi, A. Vafaei. Sadr, Y. Wang, MNRAS DOI: 10.1093/mnras/stac076

2. The mass and spin of black hole and emission of the “blackholic quanta” in GRB 180720B obtained from the ultrarelativistic prompt emission (UPE) phase

F. RastegarNia, R. Moradi, J. A. Rueda, R. Ruffini, Liang. Li, S. E. Askestani, Y. Wang, S. S. Xue, Submitted to PRD

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and*

outside ICRANet (teaching activities in your university etc...]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2021 List of Publication

1. Nature of the ultrarelativistic prompt emission phase of GRB 190114C; R. Moradi, J. A. Rueda, R. Ruffini, Liang Li, C. L. Bianco, S. Campion, C. Cherubini, S. Filippi, Y. Wang, S. S. Xue, PRD 104, 063043 - Published 29 September 2021

2. brief review of binary-driven hypernova, J. A. Rueda, R Ruffini, R. Moradi, Y Wang;

International Journal of Modern Physics D, 2130007 2021

3. The morphology of the X-ray afterglows and of the jetted GeV emission in long GRBs; R. Ruffini, R. Moradi , J.A. Rueda, et al; MNRAS, Volume 504, Issue 4, July 2021, Pages 5301–5326, <https://doi.org/10.1093/mnras/stab724>

4. he newborn black hole in GRB 191014C manifests that is alive; R. Moradi, J.A. Rueda, R. Ruffini, Y. Wang. A&A 649, A75 (2021). <https://doi.org/10.1051/0004-6361/201937135>.

5. Deep Learning in Searching the Spectroscopic Redshift of Quasars. F. RastegarNia, M. T. Mirtorabi, R. Moradi, A. Vafaei. Sadr, Y. Wang, MNRAS 2022 DOI: 10.1093/mnras/stac076

Jorge A. Rueda H.

Personal Information

Date of Birth October 24, 1982

Place of Birth Barrancabermeja, Colombia

Birth

Citizenship Colombian

Education

2009–2010 Postdoctoral fellow, Sapienza University of Rome, Rome, Italy

Conducted research: Unified treatment for the description of nuclei and neutron stars based on the Thomas-Fermi model

2006–2009 Ph.D in Relativistic Astrophysics, Sapienza University of Rome, Italy

Thesis title: Electrodynamics: from nuclei to neutron stars

Thesis Advisor: Prof. Remo Ruffini

2005–2006 Master in Physics, Universidad de Los Andes, Mérida, Venezuela – Universidad Industrial de Santander, Bucaramanga, Colombia

Thesis title: Radiant shock waves in the post-quasistatic approximation

Thesis Advisor: Prof. Luis Nuñez

2000–2005 Physicist, Universidad Industrial de Santander, Bucaramanga, Colombia

Thesis title: Equilibrium of binary systems involving one extreme object in the stationary vacuum case

Thesis Advisor: Prof. Jose David Sanabria Gómez

Additional Qualifications

	Computer Skills
Operative Systems	Linux, Windows
Programming Languages	Fortran 77, Fortran 90, C, C++, Python Wolfram
Scientific Software	Mathematica, Maple, Gnuplot, LaTeX

Languages

Spanish Native

Italian Spoken (excellent), listen comprehension (excellent), written (excellent) English
Spoken (very good), listen comprehension (very good), written (excellent)

Portuguese Spoken (very good), listen comprehension (excellent), written (very good)

Employment History

Administrative

2013–2017 Coordinator CAPES-ICRANet Program, International Center for Relativistic Astrophysics Network (ICRANet), Pescara, Italy

2011–current Coordinator of international, bilateral cooperation agreements at ICRANet, Pescara, Italy

Scientific Research and Teaching

2012–current Faculty Professor, International Relativistic Astrophysics (IRAP) PhD Program

2011–current Full Professor, ICRANet, Pescara, Italy

2019–current Professor, ICRANet-Unife joint appointment, Physics Department, University of Ferrara, Italy

2011–current Associate Researcher, International Center for Relativistic Astrophysics (ICRA), Rome, Italy

2012–2017 Professor, ICRANet-Sapienza joint appointment, Physics Department, Sapienza University of Rome, Italy

2006–2011 Scientific Assistant of ICRANet, Pescara, Italy 2006–2011
Substitute Professor. Sapienza University of Rome, Italy

- 2006 Lecturer, Differential Calculus. Universidad de Los Andes, Mérida, Venezuela
- 2005 Lecturer, Physics I. Universidad Industrial de Santander, Bucaramanga, Colombia
- 2005 Lecturer, Waves and Oscillations. Universidad Industrial de Santander, Bucaramanga, Colombia
- 2004 Assistant lecturer, Newtonian Mechanics. Universidad Industrial de Santander, Bucaramanga, Colombia

Advisor of Undergraduate/Master Thesis

2019–current Student: Farhad Zekavat, University of Ferrara, Italy 2015–2016

Student: Silvia Petroni, Sapienza University of Rome, Italy 2015–2016 Student:

Davide Gizzi, Sapienza University of Rome, Italy

Advisor of Ph. D. Thesis

2018–2021 Student: Gulmira Nurbakyt, Al-Farabi Kazakh National University, Almaty, Kazakhstan

Thesis in progress: Gravitational field of compact objects in general theory of relativity

2018–2021 Student: Gulnur Zhumakhanova, Al-Farabi Kazakh National University, Almaty, Kazakhstan

Thesis in progress: Dark matter profiles in galactic bulges and halos 2017–

2020 Student: Eduar Becerra, Sapienza University of Rome, Italy

Universidad Industrial de Santander, Bucaramanga, Colombia

Thesis in progress: Neutrino-antineutrino annihilation and the genesis of the electron-positron pair plasma powering gamma-ray bursts

2016–2020 Student: Stefano Campion, Sapienza University of Rome, Italy

Thesis in progress: High-energy emission, proton-proton interactions, and magnetic pair production in the binary-driven hypernovae

2016–2020 Student: Massimo Carinci, Sapienza University of Rome, Italy Thesis in progress: Fermionic versus bosonic dark matter

2016–2019 Student: Geanderson Araujo Carvalho, Instituto Tecnológico de Aeronáutica, Sao Jose dos Campos, Brazil

Thesis: White dwarfs in general relativity, modified theories of gravity and binary systems

2016–2019 Student: Ronaldo Vieira Lobato, Sapienza University of Rome, Italy Instituto Tecnológico de Aeronáutica, Sao Jose dos Campos, Brazil

Thesis: SGRs/AXPs and binary star mergers: electromagnetic and gravitational emission

2015–2018 Student: Juan David Uribe, Sapienza University of Rome, Italy

Thesis: Neutrino flavour oscillations in the process of hypercritical accretion: the case of binary-driven hypernovae

2015–2018 Student: José Rodriguez, Sapienza University of Rome, Italy

Thesis: Analytic approaches to the gravitational radiation from astrophysical sources

2013–2016 Student: Laura Becerra, Sapienza University of Rome, Italy

Thesis title: Accretion in compact stars: hypercritical accretion in the induced gravitational collapse and the post-merger evolution of white dwarf mergers

This PhD thesis was awarded with the International Astronomical Union (IAU) PhD Prize 2018, Division D, High Energy Phenomena and Fundamental Physics

- 2013–2016 Student: Gabriel Gómez, Sapienza University of Rome, Italy
University of Nice Sophia-Antipolis, Nice, France
- Thesis title: Astrophysical implications of the fermionic dark matter in galaxies
- 2012–2015 Student: Federico Cipolletta, Sapienza University of Rome, Italy
- Thesis title: Structure of rotating self-gravitating figures of equilibrium in Newtonian gravity and general relativity with an emphasis on neutron stars
- 2012–2015 Student: Fernanda Gomes Oliveira, Sapienza University of Rome, Italy
University of Nice Sophia-Antipolis, Nice, France
- Thesis title: X, gamma-ray and gravitational wave emission from short and long GRBs and their detection rates
- 2011–2015 Student: Diego Leonardo Cáceres Uribe, Sapienza University of Rome, Italy
- Thesis title: Massive fast rotating highly magnetized white dwarfs: theory and astrophysical applications
- 2011–2014 Student: Jonas Pedro Pereira, Sapienza University of Rome, Italy
University of Nice Sophia-Antipolis, Nice, France
- Thesis title: General relativistic electrodynamical processes in neutron stars and black holes
- 2011–2014 Student: Carlos Argüelles, Sapienza University of Rome, Italy
Thesis title: Fermionic dark matter on galaxy scales
- 2010–2013 Student: Sheyse Martins de Carvalho, Sapienza University of Rome, Italy
University of Nice Sophia-Antipolis, Nice, France
- Thesis title: Finite temperature effects in the white dwarf structure and neutron star cooling in general relativity
- 2008–2013 Student: Riccardo Belvedere, Sapienza University of Rome, Italy
- Thesis title: Static and rotating neutron stars in a general relativistic formulation of fundamental interactions and their astrophysical applications
- 2009–2012 Student: Kuantay Boshkayev, Sapienza University of Rome, Italy
- Thesis title: Rotating white dwarfs and neutron stars in general relativity

Supervisor of Post-doctoral Fellows

2013–2015 Riccardo Belvedere, CAPES-ICRANet Program Fellow at ICRANet - Riode Janeiro, Brazil

2013–2015 Rafael Camargo Rodrigues de Lima, CAPES-ICRANet Program Fellow at ICRANet - Pescara, Italy

2013–2015 Jaziel Goulart Coelho, CAPES-ICRANet Program Fellow at Sapienza University of Rome, Italy

Lecturer in Workshops and Ph. D. Schools (partial list)

2019 RAGtime 21 workshop, 16–20 September, Institute of Physics, Faculty of Philosophy and Science of the Silesian University in Opava, Czech Republic

- 2019 The Open Universe International Doctoral School: “The discovery of Black Holes”, 10–14 June, Nice, France
- 2018 41th International School for Young Astronomers (ISYA), 23–27 July, El Socorro, Colombia
- 2017 Fifth Bego Rencontres - IRAP Ph.D. Erasmus Mundus School, 15–19 May, Nice, France
- 2016 Fourth Bego Rencontres - IRAP Ph.D. Erasmus Mundus School, 30 May–3 June, Nice, France
- 2014 Third Bego Rencontres - IRAP Ph.D. Erasmus Mundus School, 9–19 September, Nice, France
- 2014 IRAP Ph.D. Erasmus Mundus School, 11–16 May, Les Houches, France
- 2013 Second Bego Rencontres - IRAP Ph.D. Erasmus Mundus School, 16–31 May, Nice, France
- 2012 IRAP Ph.D. Erasmus Mundus School, 3–21 September, Nice, France
- 2011 IRAP Ph.D. Erasmus Mundus School, 5–16 September, Nice, France
- 2011 IRAP Ph.D. Erasmus Mundus School, May 25–June 10, Nice, France
- 2011 IRAP Ph.D. Erasmus Mundus Workshop: From Nuclei to White Dwarfs and Neutron Stars, 3–8 April, Les Houches, France
- 2010 IRAP Ph.D. Erasmus Mundus School, 1–30 September, Nice, France

Organization of Conferences

- 2018 15th Marcel Grossmann Meeting on Relativistic Astrophysics, 1–7 July, Rome, Italy
- 2018 2nd Julio Garavito Armero Meeting on Relativistic Astrophysics, 1–2 August, Bucaramanga, Colombia
- 2018 The Third Zeldovich meeting, 23–27 April, Minsk, Belarus
- 2017 15th Italian-Korean Symposium on Relativistic Astrophysics, 3–7 July, Seoul, South Korea
- 2017 The Fifth Galileo-Xu Guangqi Meeting, 25–30 June, Chengdu, China
- 2016 Supernovae, Hypernovae and Binary Driven Hypernovae - An Adriatic Workshop, 20–30 June, Pescara, Italy
- 2015 14th Italian-Korean Symposium on Relativistic Astrophysics, 20–24 July, Pescara, Italy
- 2015 First Sandoval Vallarta Caribbean Meeting, 30 November–3 December, Mexico City, Mexico
- 2015 First Julio Garavito Armero Meeting on Relativistic Astrophysics, 23–27 November, Bucaramanga, Colombia

Speaker in Plenary Session

- 2019 RAGtime 21 workshop, 16–20 September, Institute of Physics, Faculty of Philosophy and Science of the Silesian University in Opava, Czech Republic

- 2018 Nuevos límites a la naturaleza de la materia oscura a partir de observables de la Vía Láctea, 2nd Julio Garavito Armero Meeting on Relativistic Astrophysics, Bucaramanga, Colombia
- 2018 Binary-driven hypernovae and the understanding of gamma-ray bursts, 15th Marcel Grossmann Meeting, Rome, Italy
- 2018 Latest news on the induced gravitational collapse scenario of long gamma-ray bursts, The Third Zeldovich meeting, Minsk, Belarus
- 2018 Simulating the induced gravitational collapse scenario of gamma-ray bursts, Conference on Particles and Cosmology, 5–9 March, Singapore
- 2017 ¿Hacia dónde van la astronomía y la astrofísica en Colombia?, 20 October, Universidad Industrial de Santander, Bucaramanga, Colombia
- 2017 Binary-driven hypernovae as multimessenger astrophysical systems, THE-SEUS Workshop, 5–6 October, Naples, Italy
- 2017 News on neutrino astrophysics from gamma-ray bursts, 9th European Summer School on Experimental Nuclear Astrophysics, 17–24 September, Santa Tecla, Italy
- 2017 On the detection rate of the gravitational-wave emission of short and long gamma-ray bursts, The Fifth Galileo-Xu Guangqi Meeting, 25–30 June, Chengdu, China
- 2017 On the rate and gravitational wave emission of short and long GRBs, 15th Italian-Korean Symposium on Relativistic Astrophysics, 3–7 July, Seoul, South Korea
- 2015 On the binary systems associated with short and long GRBs and their detectability, 14th Marcel Grossmann Meeting, Rome, Italy
- 2012 Extreme systems in relativistic astrophysics, 3rd Colombian Meeting on Astronomy and Astrophysics, Bucaramanga, Colombia
- 2012 Strong, weak, electromagnetic, and gravitational interactions in neutron stars, 13th Marcel Grossmann Meeting, Stockholm, Sweden
- 2011 On the Einstein-Maxwell-Thomas-Fermi equations for white dwarfs and neutron stars, 3rd Galileo-Xu Guangqi Meeting, Beijing, China
- 2009 A the self-consistent treatments of neutron star configurations, 11th Italian-Korean Symposium on Relativistic Astrophysics, Seoul, Korea
- 2009 The role of compressed electrons: from nuclei to neutron stars, 1st Galileo-Xu Guangqi Meeting, Shanghai, China

Speaker in Ordinary Sessions (partial list)

2018 15th Marcel Grossmann Meeting on Relativistic Astrophysics, 1-7 July,
Rome, Italy

2018 2nd Julio Garavito Armero Meeting on Relativistic Astrophysics, 1-2 August, Bucaramanga,
Colombia

2018 The Third Zeldovich meeting, 23-27 April, Minsk, Belarus

2017 15th Italian-Korean Symposium on Relativistic Astrophysics, 3-7 July, Seoul, South
Korea

2017 The Fifth Galileo-Xu Guangqi Meeting, 25-30 June, Chengdu, China

- 2016 Supernovae, Hypernovae and Binary Driven Hypernovae - An Adriatic Workshop, Pescara, Italy
- 2015 14th Italian-Korean Symposium on Relativistic Astrophysics, Pescara, Italy
- 2013 13th Italian-Korean Symposium on Relativistic Astrophysics, Seoul, South Korea
- 2012 26th Texas Symposium on Relativistic Astrophysics, Sao Paulo, Brazil
- 2012 III National Meeting on GRBs “Lampi su Napoli”, Naples, Italy
- 2012 39th COSPAR Assembly, Mysore, India
- 2012 13th Marcel Grossmann Meeting, Stockholm, Sweden
- 2011 12th Italian-Korean Symposium on Relativistic Astrophysics, Pescara, Italy
- 2011 Recent News from the MeV, GeV and TeV Gamma-Ray Domains, Pescara, Italy
- 2010 2nd Galileo-Xu Guangqi Meeting, Ventimiglia, Italy
- 2009 6th Italian-Sino Workshop on Relativistic Astrophysics, Pescara, Italy
- 2009 1st Sobral Meeting, Fortaleza, Brazil
- 2008 3rd Stueckelberg Workshop on Relativistic Field Theories, Pescara, Italy
- 2009 12th Marcel Grossmann Meeting On General Relativity, Paris, France
- 2008 APS April Meeting, St. Louis, USA
- 2007 4th Italian-Sino Workshop on Relativistic Astrophysics, Pescara, Italy
- 2006 Centro de Física Fundamental-Universidad de Los Andes, Merida, Venezuela
- 2005 Laboratorio de Astronomía y Física Teórica-Universidad del Zulia, Maracaibo, Venezuela
- 2005 Laboratorio de Astronomía y Física Teórica-Universidad del Zulia, Maracaibo, Venezuela
- 2005 Primera Reunión Colombo-Venezolana de Relatividad y Gravitación, Cartagena, Colombia
- 2005 Segundo Taller de Gravitación, Cosmología y Objetos Compactos, Universidad de Los Andes, Merida, Venezuela

Outreach Activities

- 2018 Three-dimensional view of hypernovae and gamma-ray bursts. Delivered at the inauguration of the exhibition “Einstein Fermi e Heisenberg e la nascita della Astrofisica Relativistica” e “ICRANet e Cina”, 12 December 2017 - 12 January 2018, Fondazione Marco Besso, Roma, Italy
- 2017 “Vida” después de la “muerte”: estrellas de neutrones y las explosiones más potentes del Universo. Delivered in the “Café Científico” at Casa del Libro Total, Bucaramanga, Colombia
- 2017 “Vida” después de la “muerte”: estrellas de neutrones y las explosiones más potentes del Universo. Delivered at Instituto Antonio Nariño, Barrancabermeja, Colombia
- 2017 Simulando le onde gravitazionali. Delivered at “La Notte dei Ricercatori”, Pescara, Italy

2016 Dai nuclei atomici alle stelle di neutroni ai lampi di raggi gamma. Deliverat
“La Notte dei Ricercatori”, Pescara, Italy

2016 Dai nuclei atomici alle stelle di neutroni ai lampi di raggi gamma. Delivered at “La Notte dei Ricercatori”, Pescara, Italy

2015 Stelle di neutroni nelle esplosioni più potenti dell’universo: supernove e lampi di raggi gamma. Delivered at “La Notte dei Ricercatori”, Pescara, Italy

2014 Dai nuclei alle pulsar ai gamma-ray bursts. Delivered at the ICRANet for high-school students, Pescara, Italy

Reviewer and/or Referee

Scientific Journal Referee The Astrophysical Journal, The Physical Review (C,D), Monthly Notices of the Astronomical Royal Society, Astronomy and Astrophysics, Physics Letters B, Nuclear Physics A, European Journal of Physics, Astrophysics and Space Science, Researches in Astronomy and Astrophysics, Canadian Journal of Physics, Advances and Space Research, Universe, Symmetry, Mathematical Reviews of the American Mathematical Society

Projects Referee Estonian Research Council (ETAg), Estonia

Projects Referee Science of Frontier 2019, National Council of Science and Technology, CONACYT-Gobierno de México, Mexico

Scientific Advisor National Center of Science and Technology Evaluation, Ministry of Education and Science, Kazakhstan

Projects Referee Agencia Nacional de Promoción Científica y Tecnológica and Fondo para la Investigación Científica y Tecnológica del Ministerio de Ciencia, Tecnología e Innovación Productiva, Argentina

Memberships

INAF, Istituto di Astrofisica e Planetologia Spaziali Member of the Italian Physical Society

Member of the American Physical Society

Member of the International Astronomical Union – Division D “High Energy Phenomena and Fundamental Physics”

Member of the Brazilian Physical Society

Member of the Colombian Academy of Physical and Natural Sciences – Node AstroCO-IAU

Awards

Award 2019 Third Award in the Gravity Research Foundation essay competition, Gravity Research Foundation, USA

Award 2016 Distinguished Graduate Award, Universidad Industrial de Santander, Bucaramanga, Colombia

Fellowship 2013-2016 Senior Visiting Professor Fellowship, CAPES-ICRANet Program, Brazil

Fellowship 2010 Postdoctoral Fellowship, Sapienza University of Rome, Rome, Italy

- Fellowship 2006-2009 Ph.D. Fellowship, International Relativistic Astrophysics Ph. D. Program, Sapienza University of Rome, Italy
- Award 2005 National Prize Otto de Greiff to the best undergraduate thesis, August 2006. Best undergraduate thesis of Natural Sciences in Colombia 2005: Equilibrium of binary systems involving one extreme object in the stationary vacuum case, Bucaramanga, Colombia
- Award 2005 Awarded undergraduate thesis: Equilibrium of binary systems involving one extreme object in the stationary vacuum case, May 2005. Physics Department, Universidad Industrial de Santander, Bucaramanga, Colombia
- Fellowship 2002 Distinguished student, Physics Department, Universidad Industrial de Santander, Bucaramanga, Colombia
- Award High-School Award for the results in the National Test of Knowledge (371/400) in 1999. Instituto Antonio Nariño, Barrancabermeja, Colombia
- Award 1999 First place in the XV Natural Sciences Olympiads, 1999. Award: fellowship to pursue any university career at Universidad Autónoma de Bucaramanga (UNAB)-Instituto Caldas, Bucaramanga, Colombia

Vereshchagin Gregory

Position: professor
Period covered: 2021



I Scientific Work

This year scientific work was focused on the following aspects:

- Reaction rates of three-particle interactions in relativistic plasma (with M.A. Prakapenia)

We perform calculations of nonequilibrium reaction rates for all triple interactions in relativistic plasma including: relativistic bremsstrahlung, double Compton scattering, radiative pair production, triple pair production/annihilation and their inverse processes. Reaction rates are computed out of first principles, numerically integrating exact QED matrix elements over the phase space of particles. Example is given for photon emission by hot thermal electron-positron pairs.

- Interaction rates in relativistic plasma with baryons (with M.A. Prakapenia)

In addition to interactions between electrons, positrons and photons we are considering electromagnetic interaction with baryons. The presence of baryons modifies kinetics in non-equilibrium relativistic plasma, with respect to the pure leptonic case. Instead of approximate expressions for reaction rates, used previously, we compute interaction rates out of first principles. We are also developing a new numerical code capable of solving relativistic kinetic equations for spherically symmetric case. This code will be used to study thermalization and transport in optically thick plasmas composed of electrons, positrons and photons.

- Correlations in relativistic plasma (with M.A. Prakapenia)

The relativistic Boltzmann equation is traditionally derived out of quantum field theory when particle correlations are neglected. We are reconsidering this derivation with the focus on conditions which can be used to derive kinetic equations for particle correlations. Such correlation analysis is important for establishment of validity conditions of relativistic Boltzmann equation, as well as to the study of non-equilibrium kinetics for strongly correlated relativistic plasmas.

- The motion and radiation of a test charged particle in the vicinity of a black hole (with S. O. Komarov and A. K. Gorbatsievich)

We are developing new methods for calculation of electromagnetic field from a test charge, moving in the vicinity of a black hole, taking into account both the curvature of the spacetime and the radiation reaction on the motion of the charge.

- Is magnetically dominated outflow required to explain GRBs? (with D. Begue and L. Li)

The composition of relativistic outflows producing gamma-ray bursts is a long standing open question. One of the main arguments in favor of magnetically dominated outflows is the absence of photospheric component in their broadband time resolved spectra, with such notable examples as GRB 080916C. Here we perform accurate analysis of time resolved spectra of this GRB and confirm the previous detection of additional spectral component in GRB 080916C. We show that this subdominant component is consistent with the photosphere of ultrarelativistic baryonic outflow, deep in the coasting regime. We argue that, contrary to previous statements, the magnetic dominance is not required for interpretation of observations of this GRB. Moreover, simultaneous detection of high energy emission in its prompt phase requires departure from a simple one-zone emission model.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Editing the proceedings of the 16th Marcel Grossman Meeting, with 390 papers, to be published by World Scientific in 2022.
- Editing the proceedings of the Fourth Zeldovich virtual meeting, with 37 papers published in the refereed journal *Astronomy Reports*, volume 65, issue 10, 2021, link: <https://link.springer.com/journal/11444/volumes-and-issues/65-10>;
- Organized a parallel session “GB3 - Photospheric Emission in GRBs” at MG16 co-chaired with D. Begue.
- talk “Diffusive photospheres in gamma-ray bursts”, 16th Marcel Grossman Meeting, July 5, 2021, online.
- talk “Kinetic effects in nonequilibrium electron-positron plasmas”, 107 SIF National Congress, 13-17 September 2021, online.

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

- consultations on the first lecture course on theoretical astrophysics for theoretical physics students at the Belarusian State University
- consultations on the lecture course on relativistic kinetic theory for theoretical physics students at the Belarusian State University

II e. Work With Postdocs

- Mikalai Prakapenia: Kinetics of nonuniform and (or) anisotropic relativistic plasma with correlations
- Stanislav Komarov: the motion and radiation of a test charged particle in the vicinity of a black hole

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

- member of the IRAP PhD Faculty
- coordination of cooperation with the Belarusian State University
- coordination of cooperation with the National Academy of Sciences of Belarus
- coordination of activities in ICRANet-Minsk center
- chair of the LOC of 16th Marcel Grossman meeting
- co-chair of the parallel session “GB3 - Photospheric Emission in GRBs” at MG16
- editor of the proceedings of MG16
- editor of the Fourth Zeldovich Meeting proceedings
- supervision of the ICRANet newsletter
- supervision of ICRANet press releases

III b. Outside ICRANet

- PI in the Joint BRFFR – ICRANet – 2021 program, project title: “Kinetics of nonuniform and (or) anisotropic relativistic plasma with correlations”
- PI in the Joint BRFFR – ICRANet – 2021 program, project title: “The motion and radiation of a test charged particle in the vicinity of a black hole”

IV. Other

2021 List of Publication

3. M. A. Prakapenia and G. V. Vereshchagin, “Numerical scheme for evaluating the collision integrals for triple interactions in relativistic plasma”, *Astronomy Reports*, volume 65 (2021), pp. 1011–1014.
4. D. Begue, L. Li and G. V. Vereshchagin, “Is magnetically dominated outflow required to explain GRBs?”, arXiv:2201.05062, submitted to MNRAS.

YU WANG

EMAIL: YU.WANG@ICRANET.ORG

INTRODUCTION

Yu Wang works on data of astrophysics, analyzing and interpreting the high-energy X-ray and gamma-ray data (e.g. Swift, NuSTAR and Fermi satellites), as well as collaborating on the optical data analysis. He also works on the theory of high-energy astrophysics, especially the neutron star, black hole and gamma-ray burst. Based on the experience of data analysis, theoretical modelling and computer programming, Yu Wang currently focuses on the machine learning of astrophysics, he is working and collaborating on building the neural networks for active galactic nuclei, cosmology, gamma-ray burst and gravitational wave. Different from the traditional methodologies of understanding the nature either by proposing a theory or by summarizing the observations, he is willing to promote the novel methodology that human understands the nature by understanding the machine which looks at the big data and generates its intuition as physical laws.

EDUCATION AND WORK

SOUTHEAST UNIVERSITY

Nanjing, China — Bachelor Degree — 2003 - 2007

PURPLE MOUNTAIN OBSERVATORY, CHINESE ACADEMY OF SCIENCES

NANJING UNIVERSITY (FOR LESSONS)

Nanjing, China — Master Degree — 2008 - 2011

UNIVERSITY OF ROME - SAPIENZA

INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS (ICRANET)

Italy — Tenth Cycle, 2011-2014, of IRAP PhD

INTERNATIONAL CENTER FOR RELATIVISTIC ASTROPHYSICS (ICRANET)

Italy — Researcher, 2015 - Present

NATIONAL INSTITUTE FOR ASTROPHYSICS (INAF)

Italy — Associator, 2019 – Present

SCIENTIFIC WORK

Yu Wang has published more than 40 papers, and participated in about 20 GCN observation reports, his two catalogues have been included in the VizieR Catalog. His publications are on theoretical and data observations of gamma-ray bursts, black hole physics, gravitational waves and their electromagnetic counterparts, satellite data processing, and studying many areas of astrophysics by machine learning.

Yunis, Rafael Ignacio

Position: Graduated PhD

Period covered: December 2020 - December 2021



I Scientific Work

PhD on Relativistic Astrophysics (Finished)

Graduated with honors from the IRAP joint PhD program between Sapienza University in Rome and ICRA net, with the final thesis defended at September 14th, 2021. Supervisor: Dr. Carlos Argüelles (UNLP-ICRA net). Thesis Title: *Fermionic Dark Matter and its Self-Interactions: from Astrophysics to Cosmology*. Evaluatory committee: P. de Bernardis, M. Viel, P. Natoli.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Speaker at Fourth Zeldovich virtual meeting

Virtual Meeting, July 2020

Attended and presented "Self Interactions in WDM: A View From Cosmological Perturbation Theory (CPT)" at the Fourth Zeldovich Virtual Meeting. Proceedings will be published in the refereed journal Astronomy Reports.

Invited Speaker at VIII Cosmo@AR Meeting

Virtual Meeting, October 2020

Attended and presented "Self Interactions in WDM: A View From Cosmological Perturbation Theory (CPT)" at the VIII Cosmo@AR meeting, organized by the Argentinian cosmology community.

Poster Presentation at Dark Side of the Universe International Conference

Presented poster "Thermodynamics of fermionic dark matter at halo formation" (Manuel Díaz, Carlos R. Argüelles, Rafael I. Yunis) at the Dark Side of the Universe International Conference, organized by ICTP and university of Buenos Aires.

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [activities carried out in collaboration with ICRA net (e.g. teaching activities, conferences etc...) and outside ICRA net (teaching activities in your university etc...)]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2021 List of Publication

- **Rafael I. Yunis**, Carlos R. Argüelles, Claudia Scóccola, Diana López Nacir, Gastón Giordano. *Self-Interacting Dark Matter in Cosmology: accurate numerical implementation and observational constraints. Submitted to JCAP. arxiv: 2108.02657*
- **Rafael I. Yunis**, Carlos R. Argüelles, Diana López Nacir. *Boltzmann hierarchies for self-interacting warm dark matter scenarios. In Journal of Cosmology and Astroparticle Physics 9, 2020. arxiv: 2002.05778. DOI: 10.1088/1475-7516/2020/09/041*
- **Rafael I. Yunis**, C. R. Argüelles, N. E. Mavromatos, A. Moliné, A. Krut, M. Carinci, J. A. Rueda, R. Ruffini. *Galactic Center constraints on self-interacting sterile neutrinos from fermionic dark matter ("ino") models. In Physics of the Dark Universe 30, 2020. arxiv:2008.08464. arxiv: 2008.08464. DOI: 10.1016/j.dark.2020.100699*
- Carlos R. Argüelles, Manuel Díaz, Andreas Krut, **Rafael I. Yunis**. *On the formation and stability of fermionic dark matter halos in a cosmological framework. In Monthly Notices of the Royal Astronomical 502, Issue 3, April 2021. arxiv:2012.11709. DOI:10.1093/mnras/staa3986*
- **Rafael I. Yunis**, C. R. Argüelles, Diana López Nacir, Claudia Scóccola, Gastón Giordano. *Self Interactions in Warm Dark Matter: A View from Cosmological Perturbation Theory. Proceedings of the Fourth Zeldovich Meeting. Astronomy Reports 65, 1068–1073 (2021). DOI: 10.1134/S1063772921100425*
- C. R. Argüelles, E. A. Becerra-Vergara, A. Krut, **Rafael I. Yunis**, J. A. Rueda, R. Ruffini. *Reshaping Our Understanding On Structure Formation With The Quantum Nature Of The Dark Matter. Proceedings of the 16th Marcel Grossmann Meeting. Presented to International Journal of Modern Physics D.*
- **Rafael I. Yunis**, C. R. Argüelles, Diana López Nacir, Claudia Scóccola, N. Mavromatos, A. Krut. *The Role of Self Interactions in the Cosmological Evolution of Warm Dark Matter. Proceedings of the 16th Marcel Grossmann Meeting. Presented to International Journal of Modern Physics D.*

IRAP Ph. D. Erasmus Mundus Students

Aimuratov Yerlan

Position current: researcher at Fesenkov Astrophysical Institute, Almaty, Kazakhstan

Position former: EMJD IRAP V cycle PhD student at Sapienza University of Rome (defended 25.02.2020)

Period covered: January-December 2021



I Scientific Work

GRB, GRB-SN, Wolf-Rayet stars: observation and analysis

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- *THESEUS Conference 2021, 23-26 March 2021 (on-line)*
- *Virtual OPTICON Archival School using ESO and ALMA data, 19-26 June 2021 (on-line)*
- *Sixteenth Marcel Grossmann Meeting, 5-10 July 2021 (on-line)*
- *“Scientific Communication in Astronomy” training school, 3-8 October 2021, Bertinoro, Italy (in-person)*
- *LAU Symposium 366 “The Origin of Outflows in Evolved Stars”, 1-5 November 2021, Leuven, Belgium (on-line)*
- *ICRANet-ISFAHAN Astronomy Meeting, 3-5 November 2021, Isfahan, Iran (on-line)*
- *Amati Fest, 6-7 December 2021, ICRANet-Pescara (on-line)*

II b Work With Students

- *none*

II c Diploma thesis supervision

- *Tursynbek Yernazarov (al-Farabi Kazakh National University)*

II d Other Teaching Duties

- *Intro to Nuclear Astrophysics (al-Farabi Kazakh National University)*

II e. Work With Postdocs

- *GRB-SN with ICRANet postdocs Rahim Moradi and Liang Li*

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

- *participation and oral talk “GeV-GRB-SN: compare and contrast”, Sixteenth Marcel Grossmann Meeting, 5-10 July 2021 (on-line)*
- *participation and oral talk “Universality of Peaking Time of Supernovae Associated with Gamma-Ray Bursts”, ICRANet-ISFAHAN Astronomy Meeting, 3-5 November 2021, Isfahan, Iran (on-line)*
- *participation, Amati Fest, 6-7 December 2021, ICRANet-Pescara (on-line)*

III b. Outside ICRANet

- *monthly scientific seminars at Fesenkov Astrophysical Institute*
- *seminars at al-Farabi Kazakh National University*

IV. Other

- *visiting scientist at ICRANet-Pescara, October 2021*

2021 List of Publication

- <https://orcid.org/0000-0001-5717-6523>

Bruno Arsioli

Assegno Ricerca at Univ. Trieste - IT . PhD in Relativistic Astrophysics
+ 55 19 99 600 0808 . bruno.arsioli@gmail.com

CV Summary

A Ph.D. in Relativistic Astrophysics (Erasmus Mundus IRAP) with five years of experience as researcher in Astrophysics. Work focus: Multifrequency and Multimessenger Astrophysics and the consolidation of Astroinformatics. Developing Machine Learning (ML) Python tools for source classification, feature extraction, and source discovery based on multi-frequency data. Vast experience in cross-matching archival data from radio up to gamma-rays and astroparticles, to build multi-messenger spectral data-frames. Enthusiast of the potentials of Machine Learning applied to Astrophysics, and acquainted with gamma-ray data analysis with Fermi-LAT. Shell Scripts for parallel computing on clusters. Deal with large-scale data analysis for all-sky surveys, and cross-match big datasets for astrophysical source discovery.

Expertise involving all stages of large catalogue preparation, validation, and release, including statistical tests for the study of population properties. Currently involved with the search & detection of new gamma-ray blazars and VHE candidates (1 & 2BIGB, 1 & 2WHSP, and 3HSP catalogues).

Affiliations **Università Degli Studi di Trieste**, Trieste (Italy). Assegno di Ricerca. Dipartimento di Fisica. bruno.sversutarsioli@units.it

International Center for Relativistic Astrophysics Network – ICRANet, Pescara (Italy). bruno.sversutarsioli@icranet.org

Language Fluent in English, Italian and Portuguese

Journal

Referee

MNRAS Monthly Notices of the Royal Astronomical Society (IF 5.2)

ApJ Astrophysical Journal (IF 5.7)

PROCEEDINGS A Proceedings of the Royal Society A (IF 2.8)

AA Advances in Astronomy (IF 2.3)

Collaboration **Member of the Fermi-LAT Collaboration**, Since July 2021. Investigates the gamma-ray emission from Active Galactic Nuclei (AGNs) and the Sun's disk.

Invited

Collaboration

Technical University of Munich (TUM), Dec. 2017 - Sep. 2018. Member of the ASI-ESO High Energy Astronomers Team, to collaborate with IceCube, for the discovery of the first extragalactic neutrino source: blazar TXS0506+056. Contributed with dedicated gamma-ray analysis.

Tsung-Dao Lee Institute at Shanghai Jiao Tong University, China, Feb-Jun 2021. Member of the High-Energy team; Implementing large-scale parallel processing of gamma-ray Light-Curves with the Fermi-LAT data, to study connections between astroparticles and multifrequency activity.

Mentoring

Msc. Student

Advisor. Master degree in Physics. Student: Blessing Musiimenta. Thesis: Identification of new gamma-ray blazars with Fermi-LAT. Mbarara University of Science and Technology, Uganda (Oct. 2019). Currently, B Musiimenta is a PhD student in Astrophysics at Bologna University - Italy.

Postdoctoral Fellowships

POSTDOC University of Trieste, Trieste (Italy), 25/07/2021 - 24/07/2022

Research Project: Gamma-rays from the quiet Sun. Localization of the gammaray photons produced by the Sun's disk, investigating non-isotropic emission at $E > 20$ GeV, and spectral deep at $30 \text{ GeV} < E < 50 \text{ GeV}$.

POSTDOC IFGW Unicamp, Campinas (Brazil), 01/05/2017 - 30/06/2020

Research Project: Phase II (2019-2020); Machine Learning applied to multifrequency data in astrophysics for blazar/AGN classification, feature extraction, and discovery of new blazar-like sources. Phase I (2017-2019); Cross-correlation studies of astrophysical neutrinos and cosmic rays with gamma-ray sources, and source discovery with Fermi-LAT. **Fellowship:** FAPESP “Fundação de Amparo a Pesquisa do Estado de São Paulo” - SP, Brazil.

POSTDOC Space Science Data Center, Rome (Italy), 01/01/2015 - 30/12/2016

Research Project: Multi-frequency approach to Active Galactic Nuclei. All-Sky Search for new gamma-ray Blazars within Fermi-LAT data. Unveiling GeV-TeV targets for the Cherenkov Telescope Array (CTA). **Fellowship:** “Ciência Sem Fronteiras”, Cnpq, Brazil.

Education & Grants

PHD RELATIVISTIC ASTROPHYSICS - 16/12/2014

Grant: IRAP Ph.D. Erasmus Mundus Program

Sapienza University of Rome, Rome (Italy), 01/03/2012 - 16/12/2014

Thesis Title: Multifrequency data from Active Galactic Nuclei & Blazars. Abstract: Built a sample of extreme blazars (1WHSP) based on cross-matching multifrequency databases. Those sources served as seeds for likelihood analysis with Femi-LAT and revealed hundreds on new gamma-ray sources. Improved our knowledge of the very high-energy sky. Cross-correlation with the arrival direction of ultra high energy cosmic rays (UHECR) was investigated and showed promising hints of time-spatial connections to explore.

MSC NUCLEAR FUSION SCIENCE AND ENGINEERING PHYSICS

Grant: Erasmus Mundus Fusion-EP Program. Stays on joint Universities: For courses: Madrid (Spain), Nancy (France); For the Thesis: Max-Planck-Institut fur Plasmaphysik, Munich. Total time: 01/09/2008 - 01/07/2010.

Thesis Title: Calculation of Neutral Beam Injection Power Deposition for He Plasmas in ASDEX Upgrade. Abstract: Simulated the power deposition of highenergy beams (of hydrogen and deuterium) interacting with helium plasmas confined at Asdex tokamak. Studied the efficiency of plasma heating with highly energetic neutral beams, taking into account beam-ionization and its effects on beam-absorption, particles cross-sections and power transfer to the plasma.

M.S. PHYSICS

IFGW Unicamp, Brazil: 01/03/2007 – 30/07/2008 —> BREAK —> 01/08/2010 - 16/05/2011. **Grant:** Cnpq, Brazil. Break due to MSC in Nuclear Fusion (above).

Thesis Title: Determination of Ionic Temperature via Vacuum Ultraviolet Spectroscopy, and Plasma Heating using Neutral Beam Injection. Abstract: Development of optical and UV technics for measuring Ion temperature of energetic plasma confined in tokamak reactors.

BA CHEMICAL ENGINEERING

FEQ Unicamp, Campinas (Brazil), 01/03/2002 - 15/12/2006.

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ML

Experience

- Implementation of **Machine Learning models (with Python and PyTorch)** for astrophysical source classification based on multi-frequency data; see arxiv:2005.03536 **published in MNRAS** (2020). This work was developed in a cloudbased environment (Google Colab) to access multi CPU & GPU for ML model training.
- Since 2019 is actively engaged in **ML training with Python** and has followed a series of courses from IBM, MIT, Univ. Montreal-Mila. Those courses have consolidated a knowledge base to bridge Astrophysics to Computer Science and is the core of the experience with Astroinformatics.
- Is acquainted with the use of Bayesian methods for the **optimization of hyperparameters in ML** models; having experience with the **Optuna and HyperOpt** libraries implemented in Python.
- Currently, has two works in preparation involving applications of Machine Learning to Astrophysics: i) The use of Machine Learning Regression models applied to Multifrequency Data for the autonomous estimate of the synchrotron peak parameter from blazars; ii) The use of One-Class Machine Learning models coupled to multifrequency data to search for new blazars (a method to extend in search for other source types).

Skills • Data Mining

- Python & Shell Scripting
- Large-Scale Computation on Clusters
- Pattern Discovery and Sample Selection Technics
- **Machine & Deep Learning with Python and PyTorch**
- **Cross-matching Multi-frequency & Multi-messenger databases**

Software • Python, Github, Google Colab for GPU and TPU computing

- **Shell scripting** for parallel computing in clusters, **Vi** to handle BigData tables
- Wolfram Mathematica, DS9 (fits image), Latex, Linux, Mac, Win
- TopCat & Stilts (spatial cross-matching, plot, handle large datasets)
- Swift Science Tools (X-ray and UV data analysis)
- **Fermi-LAT Science Tools** (expert in gamma-ray data analysis)
- SQL for BigData mining (Experience on WISE database; billions of data entries)

Independent

Writing

Articles and Scientific Reports
Presentations & Science Outreach
Proposals for Research Funds, Thesis evaluation
Proposals for Multi-wavelength Observation Campaigns

Multiwavel.

Observation

Proposals

Swift Satellite. X-ray&UV observations of 60 1BIGB sources. Completed in 2017.

Swift Satellite. X-ray&UV observation of 80 1WHSP blazars. Completed in 2015.

Nu-Star Satellite. X-ray TOO observation of 7 extreme blazars.

Magic Very High Energy Observatory. Submitted to Cycle 13, 7 VHE targets.

HESS Very High Energy Observatory. 7 VHE targets (2014).

Page 3

Teaching

Assignments

General Physics I - F128, 12h/week, IFGW Unicamp, Campinas, PED program.

Under the guidance of Prof. Dr. Luiz Marco Brescansin, Jun.-Dec. 2011.

Experimental Physics III (Electrodynamics) - F329, 8h/week, IFGW Unicamp,

Campinas, PED program. Under the guidance of Prof. Dr. Márcio Alberto Araujo Pudenzi, Jun.-Dec. 2010

General Physics I - F128, 12h/week, IFGW Unicamp, Campinas, PED program. Under the guidance of Prof. Dr. Edison Zacarias da Silva, Jan.-Jul. 2008.

[Thesis](#)

[Referee](#)

Thesis Referee (Evaluation Committee Member). Ph.D. degree in Relativistic Astrophysics, IRAP. Student: Juan David Uribe Suárez. Thesis: Neutrino oscillation within the induced gravitational collapse paradigm of long γ -ray bursts. Sapienza University of Rome, Italy (2019).

Thesis Referee (Evaluation Committee Member). Ph.D. degree in Relativistic Astrophysics, IRAP. Student: YuLing Chang. Thesis title: Multifrequency studies of very-high-energy peaked blazars. Sapienza University of Rome, Italy (2018).

Thesis Referee (Evaluation Committee Member). Ph.D. degree in Relativistic Astrophysics, IRAP. Student: Carlos Henrique Brandt. Thesis title: A deep X-ray view of Stripe-82: Improving the data legacy in the search for new blazars. Sapienza University of Rome, Italy (2018).

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[Conferences](#) **Solar Meeting (for the Fermi-LAT collaboration)**, Dec, 2021. Presentation: Updates on the Localization of GeV gamma-ray photons from the quiet Sun.

The Fermi LAT Collaboration Meeting, (remote), 01-04 Sep, 2021.

Presentation: Localization of GeV gamma-ray photons from the quiet Sun.

Extreme19 – Conference on Extreme Blazars, Padova (Italy), Jan 22-25, 2019.

Presentation: The 2BIGB gamma-ray catalogue: Extreme & High Synchrotron Peak Blazars newly detected over 10 years of Fermi-LAT observations.

Superdense Matter in the Universe, Workshop, Instituto Nacional de Pesquisas Espaciais (Inpe), São José dos Campos (Brazil), June 28 2017. Invited: Improving our description of γ -ray sky. Direct search for GeV sources with Fermi-LAT.

Cosmic Ray & Chronology Department (DRCC) Seminar, Gleb Wataghin Institute – IFGW Unicamp, Campinas (Brazil), Aug. 18 2017. Invited: Active Galactic Nuclei and Blazars. An Open Window to the Very High Energy Universe.

Adriatic Workshop on Supernovae and Hypernovae, ICRANet, Pescara (Italy), June 28, 2016. Presentation: The isotropic γ -ray background: Contribution from HSP blazars.

MG14, 14th Marcel Grossmann Meeting, Rome (Italy), July 12-18, 2015

Presentation: Multi-frequency Data for Unveiling gamma-ray sources.

Cross-Match Day. ASDC-ASI Rome (Italy) 2015. Talk: WHSP blazar catalogue. Drops in the Ocean.

ICRANet Brazilian Science Data Center Symposium. UFRGS, Porto Alegre (Brazil), Sep. 03 2015. Presentation: Science Catalogues, an Example from the ASI Science Data Center.

2nd César Lattes meeting, Niterói - Rio De Janeiro (Brazil), April 13 - 18, 2015.

Presentation: Very High Energy candidates for observation with Cherenkov Telescope Array (CTA)

Black Holes: the largest energy sources in the Universe: 1st Scientific ICRANet Meeting in Armenia, Yerevan (Armenia), 30 June - 4 July 2014. Plenary talk: VHETeV Blazar Candidates for the Upcoming Cherenkov Telescope Array (CTA).

Zeldovich - 100 Meeting in Subatomic particles, Nucleons, Atoms, Universe. International conference in honour of Ya. B. Zeldovich 100th Anniversary, Minsk (Belarus), March 10-14, 2014. Plenary talk: Active Galactic Nuclei & Very High

Energy Blazars.

Bologna High Energy Meeting - Boehme, Bologna (Italy), April 7-9, 2014.

IRAP Ph.D. Erasmus Mundus Workshop; Supernovae, Gamma - ray bursts and the induced gravitational collapse, Les Houches (France), May 11 - 16, 2014.

Magic AGN WG Meeting, ASI-ESRIN Science Data Center, Frascati (Italy), 11-14 Feb, 2013.

Erasmus Mundus School, Nice, France, 15th - 31st May, 2013. Presentation: Selection schemes for building samples of HSP blazars: TeV candidates.

The 2013 yearly ICRANet Scientific Meeting on Relativistic Astrophysics, Pescara (Italy), June 3 - 21, 2013. On the Occasion of the 50th Anniversary of the Kerr solution of the Einstein's equations.

Erasmus Mundus Summer School in Relativistic Astrophysics, Nice (France), 2-21 Sep, 2013. Presentation: Statistical Properties of HSP blazars: TeV Candidates.

10th Agile Workshops ASDC, Rome (Italy). April 18 2012.

Erasmus Mundus School on Relativistic Astrophysics, Nice (France), 3-19 Sep. 2012. Presentation: Active Galactic Nuclei and Blazars.

MG13, 13th Marcel Grossmann Meeting, Stockholm (Sweden), 1 - 7 July, 2012.

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[Schools & training](#)

PyTorch for Machine Learning; IBM ML0210EN, EdX, ongoing (2021).

Deep Learning Essentials; Univ Montreal, Mila & IVADO, EdX, Feb 2021.

Deep Learning Fundamentals with Keras; IBM course on Edx, Jan 2021

PyHEP 2020 workshop; (virtual) 13-17 Jun 2020

Machine Learning Techniques & Data Science; MIT, Stanford and IBM remote courses on Edx, Udacity portals, 2019 - 2020.

Neutrino Physics and Astrophysics School; Campinas, Brazil, 03-26 Sep. 2019

Machine Learning with Python; IBM course on Edx, Jan. 2019.

Analyzing & Visualizing data with Python; IBM courses on Edx, Jan. 2019.

IRAP Relativistic Astroph. Winter School; Nice, France, Feb. 23 - Mar. 2, 2014.

Summer Schools in Relativistic Astrophysics, Nice (France), 15-31 May & 2 - 21 Sep, 2013.

SIGRAV Graduate School in Contemporary Relativity and Gravitational Physics, Villa Olmo, Como (Italy), 21 - 26 May, 2012.

Erasmus Mundus School in Relativistic Astrophysics, Nice (France), 5 - 8 June & 3-19 Sep, 2012

IISS Summer School on Magnetohydrodynamics MHD and Energetic Particles, Aix en Provence (France), June 20-24, 2011.

Nuclear Fusion Science and Engineering Physics Summer School, Nancy (France), 2009.

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[List of Publications](#)
([& number of citations](#))

According to inspirehep.net, B. Arsioli has 12 published papers in refereed journals, with 954 citations, with h-index of 9, and average of 79.5 citations/year.

B. Arsioli has six databases published on open access platforms (Vizier), four of them as first author. Mostly, are multifrequency catalogs associated to AGN blazars.

If excluding "self citations": has 675 citations, with h-index of 8, and average of 56.3 citations/year;

And is currently involved with three works in preparation.

SCIENCE [1] Neutrino emission from the direction of the blazar TXS 0506+056 prior to the IceCube-170922A alert; IceCube Collab., [B. Arsioli](#), et al. Science 361, 147-151 (2018). doi:10.1126/science.aat2890; **Citations: 576**

MNRAS

[2] Machine Learning applied to Multifrequency Data in Astrophysics: Blazar Classification; [B. Arsioli](#), P. Dedin; Accepted in MNRAS (2020). DOI: 10.1093/mnras/staa2449 ; **Citations: 2**

[3] Extreme & High Synchrotron Peak gamma-ray blazars beyond 4FGL: The 2BIGB γ -ray catalog; [B. Arsioli](#), Y-L Chang, B. Musiimenta, MNRAS, 493, Issue 2, 2438–2451 (2020). doi:10.1093/mnras/staa368; **Citations: 4**

[4] Dissecting the region around IceCube-170922A: the blazar TXS 0506+056 as the first cosmic neutrino source; P. Padovani, P. Giommi, E. Resconi, T. Glauch, [B. Arsioli](#), N. Sahakyan, M. Huber; MNRAS 480, Issue 1, 192–203 (2018). DOI: 10.1093/mnras/sty1852 ; **Citations: 103**

[5] Extreme & High Synchrotron Peaked Blazars at the limit of Fermi-LAT detectability: The γ -ray spectrum of 1BIGB sources; [B. Arsioli](#), U. Barres de Almeida, E. Prandini, B. Fraga, L. Foffano; MNRAS 480, Issue 2, 2165–2177 (2018). DOI: 10.1093/mnras/sty1975 ; **Citations: 11**

[6] Extreme blazars as counterparts of IceCube astrophysical neutrinos; P. Padovani, E. Resconi, P. Giommi, [B. Arsioli](#), Y. L. Chang; MNRAS 457, Issue 4, 3582–3592 (2016). DOI: 10.1093/mnras/stw228 ; **Citations: 118**

ASTRONOMY & ASTROPHYSICS

[7] The 3HSP catalog of Extreme & High Synchrotron Peaked Blazars; Y-L Chang, [B. Arsioli](#), P. Giommi, P. Padovani, C. H. Brandt; Accepted. A&A (2019). DOI: 10.1051/0004-6361/201834526 ; **Citations: 30**

[8] The γ -ray emitting region in low synchrotron peak blazars. Testing self-synchrotron Compton and external Compton scenarios; [B. Arsioli](#), Y-L. Chang; A&A 616, A63 (2018). DOI: 10.1051/0004-6361/201833005 ; **Citations: 9**

[9] A complete sample of LSP blazars fully described in γ -rays. New γ -ray detections and associations with Fermi-LAT; [B. Arsioli](#), G. Polenta; A&A 616, A20 (2018). DOI: 10.1051/0004-6361/201832786 ; **Citations: 7**

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ASTRONOMY & ASTROPHYSICS

[10] Searching for γ -ray signature in WHSP blazars: Fermi-LAT detection of 150 excess signal in the 0.3-500 GeV band; [B. Arsioli](#), Y-L Chang; A&A 598, A134 (2017). DOI: 10.1051/0004-6361/201628691 ; **Citations: 11**

[11] 2WHSP: A multi-frequency selected catalog of HE and VHE gamma-ray blazars and blazar candidates; Y-L Chang, [B. Arsioli](#), P. Giommi, P. Padovani; A&A 598, A17 (2017). DOI: 10.1051/0004-6361/201629487 ; **Citations: 43**

[12] 1WHSP: an IR-based sample of $\sim 1,000$ VHE γ -ray blazar candidates; [B. Arsioli](#), B. Fraga, P. Giommi, P. Padovani, P. M. Marrese, A&A 579, A34 (2015). DOI: 10.1051/0004-6361/201424148 ; **Citations: 40**

PROCEEDINGS

[P1] Search for WHSP γ -ray counterparts within Fermi-LAT data: Solving a case of source confusion; [B. Arsioli](#), Y-L. Chang; Proceedings

for The Fourteenth Marcel Grossmann Meeting, pp. 3105-3113; Rome, Italy (2017). DOI: 10.1142/9789813226609_0394

[P2] **Detecting New gamma-ray Sources Based on Multi-frequency Data: The Case of 1WHSP J031423.9+061956**; [B. Arsioli](#), Y-L. Chang; API Conference Proceedings 1693 for the 2nd Cesar Lattes Meeting; Rio de Janeiro, Brazil (2015). DOI: 10.1063/1.4937209

[P3] **The Role of Higher Diffraction Order to Determine Ion Temp. in Vacuum Ultraviolet Region Using Multichannel Detector**; M. Machida, [B. S. Arsioli](#), F. Nascimento, A. M. Daltrini, J. H. F. Severo, Ivan C. Nascimento; J. Plasma Fusion Research Series, Vol. 8 (2009).

IN

PREPARATION

[0.1] **Autonomous Synchrotron Peak Estimate for Blazars: Machine Learning Regression applied to Multifrequency Data in Astrophysics**; [B. Arsioli](#) & S. Prakash (2021-2022). In prep. to submit for MNRAS.

[0.2] **The localization of gamma-ray photons from the quiet Sun**; [B. Arsioli](#), E. Orlando, N. Giglietto, S. Rainò (2021-2022). In prep. for MNRAS.

[0.3] **Multi-frequency analyses with potential IceCube neutrino sources**; Y-L Chang, [B. Arsioli](#), W. Li, (2021-2022). In prep. for MNRAS.

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DATABASES IN

OPEN ACCESS

REPOSITORIES

[1] VizieR Online Data Catalog: 1WHSP: VHE gamma-ray blazar candidates ([B. Arsioli](#) +, 2015): **Description:** Provided Very High Energy targets in GeVTeV band, for observations with Cherenkov Telescope observatories.

[2] VizieR Online Data Catalog: The 2WHSP catalog of HE and VHE gamma-ray blazars (Y-L Chang. & [B. Arsioli](#) +, 2017). **Description:** This database has successfully delivered multifrequency seed positions in the sky, that allowed the detection of hundreds of new gamma-ray sources with the Fermi-LAT mission, and resulted in two other catalogues: 1BIGB and 2BIGB gamma-ray catalogs.

[3] VizieR Online Data Catalog: The 3HSP catalogue of Extreme & High Synchrotron Peaked Blazars (Y-L Chang. & [B. Arsioli](#) +, 2017). **Description:** Provided Very High Energy targets in GeV-TeV band, for observations with the Cherenkov Telescope Array, CTA.

[4] VizieR Online Data Catalog: The 1BIGB catalog of new gamma-ray signatures in WHSP blazars ([B. Arsioli](#) +, 2017). **Description:** Presents ~150 new gamma-ray detections (1-500GeV) and provides the associated spectral parameters.

[5] VizieR Online Data Catalog: Extreme & High Synchrotron Peak Blazars beyond 4FGL: The 2BIGB gamma-ray catalogue ([B. Arsioli](#) +, 2020).

Description: Presents ~250 new gamma-ray detections (1-500GeV) and provides the associated spectral parameters.

[6] VizieR Online Data Catalog: The Spectral Energy Distribution for the 2BIGB gamma-ray sources ([B. Arsioli](#) +, 2020). **Description:** Provides the spectral fluxes along (1-500GeV), allowing to draw the GeV Spectral Energy Distribution of ~250 sources.

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List of Publications

(& number of citations)

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prior to the IceCube-170922A alert; IceCube Collab., B. Arsioli, et al.

Science 361, 147-151 (2018). doi:10.1126/science.aat2890; **Citations: 576**

MNRAS

[2] **Machine Learning applied to Multifrequency Data in Astrophysics:**

Blazar Classification; B. Arsioli, P. Dedin; Accepted in MNRAS (2020).

DOI: 10.1093/mnras/staa2449 ; **Citations: 2**

[3] **Extreme & High Synchrotron Peak gamma-ray blazars beyond 4FGL:**

The 2BIGB γ -ray catalog; B. Arsioli, Y-L Chang, B. Musiimenta, MNRAS,

493, Issue 2, 2438–2451 (2020). doi:10.1093/mnras/staa368; **Citations: 4**

[4] **Dissecting the region around IceCube-170922A: the blazar TXS**

0506+056 as the first cosmic neutrino source; P. Padovani, P. Giommi, E.

Resconi, T. Glauch, B. Arsioli, N. Sahakyan, M. Huber; MNRAS 480, Issue

1, 192–203 (2018). DOI: 10.1093/mnras/sty1852 ; **Citations: 103**

[5] **Extreme & High Synchrotron Peaked Blazars at the limit of Fermi-**

LAT detectability: The γ -ray spectrum of 1BIGB sources; B. Arsioli, U.

Barres de Almeida, E. Prandini, B. Fraga, L. Foffano; MNRAS 480, Issue 2,

2165–2177 (2018). DOI: 10.1093/mnras/sty1975 ; **Citations: 11**

[6] **Extreme blazars as counterparts of IceCube astrophysical**

neutrinos; P. Padovani, E. Resconi, P. Giommi, B. Arsioli, Y. L. Chang;

MNRAS 457, Issue 4, 3582–3592 (2016). DOI: 10.1093/mnras/stw228 ;

Citations: 118

ASTRONOMY &

ASTROPHYSICS

[7] **The 3HSP catalog of Extreme & High Synchrotron Peaked Blazars**;

Y-L Chang, B. Arsioli, P. Giommi, P. Padovani, C. H. Brandt; Accepted. A&A

(2019). DOI: 10.1051/0004-6361/201834526 ; **Citations: 30**

[8] **The γ -ray emitting region in low synchrotron peak blazars. Testing**

self-synchrotron Compton and external Compton scenarios; B. Arsioli,

Y-L. Chang; A&A 616, A63 (2018). DOI: 10.1051/0004-6361/201833005 ;

Citations: 9

[9] **A complete sample of LSP blazars fully described in γ -rays. New γ -**

ray detections and associations with Fermi-LAT; B. Arsioli, G. Polenta;

A&A 616, A20 (2018). DOI: 10.1051/0004-6361/201832786 ; **Citations: 7**

Page 1 of 3

ASTRONOMY &

ASTROPHYSICS

[10] **Searching for γ -ray signature in WHSP blazars: Fermi-LAT**

detection of 150 excess signal in the 0.3-500 GeV band; B. Arsioli, Y-L

Chang; A&A 598, A134 (2017). DOI: 10.1051/0004-6361/201628691 ;

Citations: 11

[11] **2WHSP: A multi-frequency selected catalog of HE and VHE**

gamma-ray blazars and blazar candidates; Y-L Chang, B. Arsioli, P.

Giommi, P. Padovani; A&A 598, A17 (2017). DOI:

10.1051/0004-6361/201629487 ; **Citations: 43**

[12] **1WHSP: an IR-based sample of $\sim 1,000$ VHE γ -ray blazar candidates**; [B. Arsioli](#), B. Fraga, P. Giommi, P. Padovani, P. M. Marrese, *A&A* 579, A34 (2015). DOI: 10.1051/0004-6361/201424148 ; **Citations: 40**

PROCEEDINGS

[P1] **Search for WHSP γ -ray counterparts within Fermi-LAT data: Solving a case of source confusion**; [B. Arsioli](#), Y-L. Chang; Proceedings for The Fourteenth Marcel Grossmann Meeting, pp. 3105-3113; Rome, Italy (2017). DOI: 10.1142/9789813226609_0394

[P2] **Detecting New gamma-ray Sources Based on Multi-frequency Data: The Case of 1WHSP J031423.9+061956**; [B. Arsioli](#), Y-L. Chang; API Conference Proceedings 1693 for the 2nd Cesar Lattes Meeting; Rio de Janeiro, Brazil (2015). DOI: 10.1063/1.4937209

[P3] **The Role of Higher Diffraction Order to Determine Ion Temp. in Vacuum Ultraviolet Region Using Multichannel Detector**; M. Machida, [B. S. Arsioli](#), F. Nascimento, A. M. Daltrini, J. H. F. Severo, Ivan C. Nascimento; J. Plasma Fusion Research Series, Vol. 8 (2009).

IN

PREPARATION

[0.1] **The localization of gamma-ray photons from the quiet Sun**; [B. Arsioli](#), E. Orlando, N. Giglietto, S. Rainò (2021-2022). In prep. for MNRAS.

[0.2] **Multi-frequency analyses with potential IceCube neutrino sources**; Y-L Chang, [B. Arsioli](#), W. Li, (2021-2022). In prep. for MNRAS.

Page 2 of 3

DATABASES IN

OPEN ACCESS

REPOSITORIES

[1] VizieR Online Data Catalog: 1WHSP: VHE gamma-ray blazar candidates ([B. Arsioli](#) +, 2015). **Description:** Provided Very High Energy targets in GeV-TeV band, for observations with Cherenkov Telescope observatories.

[2] VizieR Online Data Catalog: The 2WHSP catalog of HE and VHE gamma-ray blazars (Y-L Chang. & [B. Arsioli](#) +, 2017). **Description:** This database has successfully delivered multifrequency seed positions in the sky, that allowed the detection of hundreds of new gamma-ray sources with the Fermi-LAT mission, and resulted in two other catalogues: 1BIGB and 2BIGB gamma-ray catalogs.

[3] VizieR Online Data Catalog: The 3HSP catalogue of Extreme & High Synchrotron Peaked Blazars (Y-L Chang. & [B. Arsioli](#) +, 2017). **Description:** Provided Very High Energy targets in GeV-TeV band, for observations with the Cherenkov Telescope Array, CTA.

[4] VizieR Online Data Catalog: The 1BIGB catalog of new gamma-ray signatures in WHSP blazars ([B. Arsioli](#) +, 2017). **Description:** Presents ~ 150 new gamma-ray detections (1-500GeV) and provides the associated spectral parameters.

[5] VizieR Online Data Catalog: Extreme & High Synchrotron Peak Blazars beyond 4FGL: The 2BIGB gamma-ray catalogue ([B. Arsioli](#) +, 2020). **Description:** Presents ~ 250 new gamma-ray detections (1-500GeV) and provides the associated spectral parameters.

[6] VizieR Online Data Catalog: The Spectral Energy Distribution for the 2BIGB gamma-ray sources ([B. Arsioli](#) +, 2020). **Description:** Provides the spectral fluxes along (1-500GeV), allowing to draw the GeV Spectral Energy Distribution of ~ 250 sources.

Gregoris Daniele



Position: Assistant Professor (Teaching and Research) in Theoretical Physics at Jiangsu University of Science and Technology

Period covered: 1st January 2021 – 31st December 2021

I Scientific Work

I try to investigate the features of various theories of gravity both on large (e.g. Cosmology) and small (e.g. black hole physics) scales. In the former context, I am applying dynamical system techniques for reconstructing qualitatively the dynamics of some cosmological models and clarifying whether they are affected by finite-time singularities; I am also interested in understanding if those models are realistic description of the Universe with respect to cosmic chronometers datasets. In the latter context, I am applying a technique from differential geometry related to the concept of “curvature invariants” for deepening the understanding of physical properties of black hole spacetimes as the location of their horizons and their entropy.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

In 2021 I gave the following talks at International conferences:

- “On the different quantifications of backreaction in inhomogeneous cosmology”, (Virtual) XV IberiCOS meeting, March 2021.
- “Thermodynamics of Shearing Massless Scalar Field Spacetimes is Inconsistent With the Weyl Curvature Hypothesis” in a parallel session of the online 16 Marcel Grossmann conference, 2021
- “Cosmology with interactions in the dark sector: qualitative dynamics, singularities and applications” at the online 17th Italian-Korean Symposium on Relativistic Astrophysics (IK17)
- “Thermodynamics of Shearing Massless Scalar Field Spacetimes is Inconsistent With the Weyl Curvature Hypothesis” in a parallel session of the online Spanish-Portuguese Relativity meeting, EREP2021
- “Thermodynamics of Shearing Massless Scalar Field Spacetimes is Inconsistent With the Weyl Curvature Hypothesis”, Online 2021 AAPPs-DACG Workshop on Astrophysics, Cosmology and Gravitation
- “Understanding Gravitational Entropy of Black Holes: A New Proposal via Curvature Invariants”, 30th GRG in Japan (2021 online conference)

- “Thermodynamics of Shearing Massless Scalar Field Spacetimes is Inconsistent With the Weyl Curvature Hypothesis”, Recent Advances in Theoretical Cosmology and Astrophysics 2021

II b Work With Students

I have co-authored the paper “Constraints on interacting dark energy models through cosmic chronometers and Gaussian process”, EPJC (2021) 81:544, arXiv:2005.01891 [astro-ph.CO] with Muhsin Aljaf, student at University of Science and Technology of China.

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

I have co-authored the paper “Cosmological evolution with quadratic gravity and nonideal fluids”, EPJC (2021) 81:944 arXiv:2103.07718 [gr qc] with Saikat Chakraborty, postdoc at Yangzhou University.

III. Service activities *[activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)]*

III a. Within ICRANet

- I was a member of the LOC of MG16 and I provided zoom technical assistance during block 1 of parallel sessions
- Chairperson at the 17th Italian-Korean Symposium on Relativistic Astrophysics (IK17)

III b. Outside ICRANet

IV. Other

I am a member of the GNFM working group (gruppo nazionale di fisica matematica) of the Italian INDAM. I have been serving as a reviewer for Mathematical Reviews at the American Mathematical Society (the reviews I wrote are available on the MathSciNet website). I have been serving as a referee for various journals in the field of gravitational physics including MNRAS and EPJC; in particular in 2021 I have been selected for the **outstanding reviewer awards** of the journals *Classical and Quantum Gravity* (IOP) and *Universe* (MDPI).

2021 List of Publication

Publications on peer-review journals:

- Muhsin Aljaf, Daniele Gregoris, Martiros Khurshudyan, “Constraints on interacting dark energy models through cosmic chronometers and Gaussian process”, EPJC (2021) 81:544, arXiv:2005.01891 [astro-ph.CO]
- Daniele Gregoris, Kjell Rosquist, “Observational backreaction in discrete black holes lattice cosmological models”, EPJ Plus 136 (2021) 45, arXiv:2006.00855 [gr-qc]
- Saikat Chakraborty, Daniele Gregoris “Cosmological evolution with quadratic gravity and nonideal fluids”, EPJC (2021) 81:944 arXiv:2103.07718 [gr-qc]
- Daniele Gregoris, Yen Chin Ong, Bin Wang, “A Critical Assessment of Black Hole Solutions With a Linear Term in Their Redshift Function”, EPJC (2021) 81:684, arXiv:2106.05205 [gr-qc]
- Daniele Gregoris, “On the connection between cosmological parameters and peculiar motion in a G_2 massless scalar field spacetime”, Int.J.Mod.Phys.D 30 (2021) 2150099

Conference proceeding:

- D. Gregoris, “Curvature Invariants and Black Hole Horizons”, Astronomy Reports, 65 (2021) 947, proceeding of the Fourth Zel’dovich meeting

Liang Li

Position: Researcher

Period covered: 2018 - present

I Scientific Work

Education

2013.09-2018.02 Stockholm University (Sweden) Astrophysics (Ph.D.)

2009.09-2012.06 Guangxi University (China) Theoretical Physics (M.S.)

2005.09-2009.06 Sichuan Normal University (China) Physics (B.S.)

Work Experience

2012.09-2013.08 Research Assistant: Department of Physics and GXU-NAOC Center for Astrophysics and Space Sciences, Guangxi University, China. Assisted the supervisor to do scientific research.

2018.03-now Researcher: International Center for Relativistic Astrophysics Network (ICRANet), Pescara, Italy

II Conferences and educational activities

II a Conferences and Other External Scientific Work

02-06 August 2021 17th Italian-Korean Meeting, Pescara, Italy, 30 minutes oral presentation

03-07 November 2021 ICRANet-Isfahan Astronomy, Isfahan (virtual), 30 minutes oral presentation

05-1 July 2021 16th Marcel Grossmann Meeting, Rome, Italy (virtual), 30 minutes oral presentation

11-07 September 2020 The Fourth Zeldovich Virtual Meeting, half hour oral presentation (virtual)

16-19 September 2019 RAGtime 21 Meeting, Opava, Czech Republic, half hour oral presentation

01-05 July 2019 16th Italian-Korean Meeting, Pescara, Italy, one hour oral presentation

13-17 May 2019 2019 Nanjing GRB Conference, Nanjing, China, 15 minutes oral presentation

25-30 June 2017 The Fifth Galileo-Xu Guanggi Meeting, Chengdu, China

20-27 July 2015 14th Italian-Korean Meeting, Pescara, Italy, 20 minutes oral presentation

12-19 July 2015 14th Marcel Grossmann Meeting, Rome, Italy

16-19 June 2014 Gamma-Ray Bursts in the Multi-Messenger Era, Paris, France

01-07 July 2013 The Eighth Jingguangxia Astrophysical Seminar, China, 15 minutes oral presentation

06-10 May 2013 2013 Multi-Messenger Transient Astrophysics Workshop KIAA, Beijing

27-31 July 2012 The Sixth Gamma-Ray Burst and other Explosive Astrophysical Seminar (organizer), 15 minutes oral speech

01-03 January 2012 The Seventh Jingguangxia Astrophysical Seminar, Xiamen University, Xiamen, China, 20 minutes oral presentation

30 Oct-03 Nov 2011 The Chinese Astronomical Society Annual Meeting 2011, a 12 minutes report

22-25 August 2011 The Fifth Gamma-ray Bursts and other Explosive Astrophysical Seminar, a 15-minute report

20-24 April 2011 The Sixth Black Hole Astrophysical Annual Conference (organizer), 20 minutes oral presentation, China

31 Oct-5 Nov 2010 The Chinese Astronomy Annual Meeting 2010, 15 minutes oral report

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

Honors and Awards

2016.09-2018.01 Stockholm University Ph.D. Scholarship

2013.09-2016.08 Erasmus Mundus Joint Doctorate Program Scholarship

2009.09-2012.06 Graduate Sponsorship

2021 List of Publication

UNDER REVIEW PAPERS

1. F. Rastegar Nia, J. A. Rueda, R. Ruffini, **Liang Li**[Corresponding Author], R. Moradi, and Yu.

Wang, “GRB 180720B: From ultrarelativistic emission phase to afterglow emission”, *Monthly Notices of Royal Astronomical Society*, [arXiv], Under review, [Journal Article].

2. Gregory Vereshchagin, **Liang Li**[Corresponding Author], and Damien Begue, “Is magnetically dominated outflow required to explain GRBs?”, *Monthly Notices of Royal Astronomical Society*, [arXiv:2201.05062], [Journal Article].

3. J. A. Rueda, R. Ruffini, **Liang Li**[Corresponding Author], R. Moradi, N.Sahakyan, “A binary white dwarf merger scenario for GRB 170817A”, *Monthly Notices of Royal Astronomical Society*, [arXiv], Under review, [Journal Article].
4. M.G. Dainotti, S. Young, **L. Li**[Corresponding Author], D. A. Kann, L. Zambrano-Tapia, H. T. Tso, A. Zambrano-Tapia, B. Cenko, M. Fuentes, K. K. Kalinowski, E. G. Sánchez-Vázquez, S. Oates, N. Fraija, N. Osborn, R. L. Becerra, A. M. Watson, N. R. Butler, J. J. González, A. S. Kuttyrev, W. H. Lee, J. X. Prochaska, E. Ramirez-Ruiz, and M. G. Richer, “The Optical Two and Three-Dimensional Fundamental Plane Correlations for More than 180 Gamma-Ray Burst Afterglows with Swift/UVOT, RATIR, and the SUBARU Telescope”, 2021, *The Astrophysical Journal Letters*, Under review, [arXiv], [Journal Article].
5. R. Moradi, **Liang Li**[Corresponding Author], R. Ruffini, J.A. Rueda, N.Sahakyan, and Y. Wang, “X-ray and GeV afterglows and sub-TeV emission of GRB 180720B”, *The Astrophysical Journal*, [arXiv:2103.09158], Under review, [Journal Article].
6. **Liang Li**, R. Ruffini, J.A. Rueda, R. Moradi, Y. Wang, and S.S. Xue, “Self-Similarities and Power-laws in the Time-resolved Spectra of GRB 190114C, GRB 130427A, GRB 160509A, and GRB 160625B”, *Astronomy & Astrophysics*, Under review, [arXiv:1910.12615], [Journal Article].
7. R Ruffini, **Liang Li**[Corresponding Author], R Moradi, J.A.Rueda, Yu Wang, S.S.Xue, C.L.Bianco, S.Campion, J.D.Fuksman, C.Cherubini, S.Filippi, M.Karlica, N.Sahakyan, “Selfsimilarity and Power-laws in GRB 190114C”, Under review, [arXiv:1904.04162], [Journal Article].
8. Yu Wang, **Liang Li**[Corresponding Author], Rahim Moradi, and Remo Ruffini, “GRB 190114C: A Gamma-ray Burst of Many faces”, Under review, [arXiv:1901.07505], [Journal Article].

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2. REFEREED PAPERS (FIRST AUTHOR, CORRESPONDING AUTHOR, AND CO-AUTHOR PUBLICATIONS)

1. Fan Xu, Jin-Jun Geng, Xu Wang, **Liang Li**, and Yong-Feng Huang, “Is the Birth of PSR J0538+2817 Accompanied by a Gamma-ray Burst?”, *Monthly Notices of Royal Astronomical*

Society, [arXiv:2109.11485], in press, [Journal Article].

2. **Liang Li**, “Standard GRB Spectral Models Misused”, 2021, *The Astrophysical Journal*, in press, [arXiv:2103.11091], [Journal Article].

3. Riccardo Ciolfi, et al. include **Li, L.**; “Multi-Messenger Astrophysics with THESEUS in the 2030s”, 2021, [2021ExA...tmp..126C], *Experimental Astronomy*, [Journal Article].

4. R. Moradi, J. A. Rueda, R. Ruffini, **Liang Li**[Corresponding Author], C. L. Bianco, S. Campion, C. Cherubini, S. Filippi, Y. Wang, and S. S. Xue, “Nature of the ultrarelativistic prompt emission phase of GRB 190114C”, *Physical Review D*, 104, 063043 (2021), [2021PhRvD.104f3043M], [Journal Article].

5. Qing-Wen Tang, Kai Wang, **Liang Li**, and Ruo-Yu Liu, “Prevalence of Extra Power-Law Spectral Components in Short Gamma-Ray Bursts”, 2021, [arXiv:2103.15355], *The Astrophysical Journal*, in press, [Journal Article].

6. R. Ruffini, R. Moradi, J. A. Rueda, **L. Li**, N. Sahakyan, Y.-C. Chen, Y. Wang, Y. Aimuratov, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, M. Karlica, G. J. Mathews, M. Muccino, G. B. Pisani, D. Primorac, S. S. Xue, “The conical morphology, jetted GeV emission, and X-ray afterglows of long GRBs”, *Monthly Notices of Royal Astronomical Society*, [2021MNRAS.504.5301R], [Journal Article].

7. **Liang Li**, Felix Ryde, Asaf Pe’er, Hoi-Fung Yu, and Zeynep Acuner “Bayesian Time-Resolved Spectroscopy of Multi-Pulsed GRBs: Variations of Emission Properties amongst Pulses”, 2021, *The Astrophysical Journal Supplement Series*, [2021ApJS..254...35L], [Journal Article].

8. Bing Zhang, Yu Wang, **Liang Li**, “Dissecting Energy Budget of a Gamma-Ray Burst Fireball”, *The Astrophysical Journal Letters*, [2021ApJ...909L...3Z], [Journal Article].

9. **Liang Li**, and Bing Zhang, “Testing High-latitude Curvature Effect of Gamma-Ray Bursts with *Fermi* Data: Evidence of Bulk Acceleration in Prompt Emission”, 2021, *The Astrophysical Journal Supplement Series*, 253, 43, [2021ApJS..253...43L], [Journal Article].

10. M.G. Dainotti, S. Livermore, D. A. Kann, **L. Li**[Corresponding Author], S. Oates, S. Yi, B. Zhang, B. Gendre, B. Cenko, and N. Fraija, “The Optical Luminosity-Time Correlation for

More Than 100 Gamma-Ray Burst Afterglows”, 2020, *The Astrophysical Journal Letters*, 905, 26, [2020ApJ...905L..26D], [Journal Article].

11. **Liang Li**, “Thermal Components in Gamma-ray Bursts. II. Constraining the Hybrid Jet Model”, 2020, *The Astrophysical Journal*, 894, 100L, [2020ApJ...894..100L], [Journal Article].

12. **Liang Li**, “Thermal Components in Gamma-ray Bursts. I. How Do They Affect Non-Thermal Spectral Parameters?”, 2019, *The Astrophysical Journal Supplement Series*, 245, 7L, [2019ApJS..245....7L], [Journal Article].

3

13. **Liang Li**, Jin-Jun Geng, Yan-Zhi Meng, Xue-Feng Wu, Yong-Feng Huang, Yu Wang, Rahim Moradi, Z.Lucas Uhm, and Bing Zhang, □ Double-tracking □ Characteristic of the Spectral Evolution of GRB 131231A: Synchrotron Origin?, *The Astrophysical Journal*, 884, 109L, [2019ApJ...884..109L], [Journal Article].

14. Y. Wang, J. A. Rueda, R. Ruffini, L. Becerra, C. Bianco, L. Becerra, **L. Li**, and M. Karlica, “Two Predictions of Supernova: GRB 130427A/SN 2013cq and GRB 180728A/SN 2018fip”, 2019, *The Astrophysical Journal*, 874, 39W, [2019ApJ...874...39W], [Journal Article].

15. **Liang Li**, “Multi-Pulse *Fermi* Gamma-Ray Bursts I: Evidence of the Transition from Fireball to Poynting-flux-dominated Outflow”, 2019, *The Astrophysical Journal Supplement Series*, 242, 16L, [2019ApJS..242...16L], [Journal Article].

16. Felix Ryde, Hoi-Fung Yu, Husne Dereli, Christoffer Lundman, Asaf Peñer, and **Liang Li**, “On the γ -Intensity Correlation in Gamma-ray Bursts: Subphotospheric Heating with Varying Entropy”, 2019, *Monthly Notices of the Royal Astronomical Society*, 484, 1912, [2019MNRAS.484.1912R], [Journal Article].

17. Ruffini, R.; Wang, Y.; Aimuratov, Y.; Becerra, L.; Bianco, C. L.; Karlica, M.; Kovacevic, M.; **Li, L.**; Melon Fuksman, J. D.; Moradi, R.; and 8 coauthors, “Early X-Ray Flares in GRBs”, 2018, *The Astrophysical Journal*, 852, 53R, [2018ApJ...852...53R], [Journal Article].

18. **Liang Li**, Xue-Feng Wu, Wei-Hua Lei, Zi-Gao Dai, En-Wei Liang, and Felix Ryde, 2018, “Constraining the Type of Central Engine of GRBs with *Swift* Data”, *The Astrophysical Journal*

Supplement Series, 236, 26L, [2018ApJS..236...26L], [Journal Article].

19. **Liang Li**, Yu Wang, Lang Shao, Xue-Feng Wu, Yong-Feng Huang, Bing Zhang, Felix Ryde, and Hoi-Fung Yu, “A Large Catalogue of Multi-wavelength GRB Afterglows I: Colors Evolution And Its Physical Implication”, 2018, *The Astrophysical Journal Supplement Series*, 234, 26L, [2018ApJS..234...26L], [Journal Article].

20. Ackermann, M. et al. include **Li, L.**; “*Fermi* Large Area Telescope Detection of Extended Gamma-Ray Emission from the Radio Galaxy Fornax A”, 2016, *The Astrophysical Journal*, 826, 1A, [2016ApJ...826....1A], [Journal Article].

21. Geng, J. J.; Wu, X. F.; Huang, Y. F.; **Li, L.**; Dai, Z. G., “Imprints of Electron-Positron Winds on the Multiwavelength Afterglows of Gamma-ray Bursts”, 2016, *The Astrophysical Journal*, 825, 107G, [2016ApJ...825..107G], [Journal Article].

22. Ackermann, M. et al. include **Li, L.**; “*Fermi*-LAT Observations of the LIGO Event GW150914”, 2016, *The Astrophysical Journal Letters*, 823L, 2A, [2016ApJ...823L...2A], [Journal Article].

23. Ackermann, M. et al. include **Li, L.**; “*Fermi* LAT Stacking Analysis of Swift Localized GRBs”, 2016, *The Astrophysical Journal*, 822, 68A, [2016ApJ...822...68A], [Journal Article].

24. Fabio Acero et al. include **Li, L.**; “The 1st *Fermi* Lat Supernova Remnant Catalog”, 2016, *The Astrophysical Journal Supplement Series*, 224, 8A [2016ApJS..224....8A], [Citations (130)], [Journal Article].

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25. Ajello, M. et al. include **Li, L.**; “Search for Spectral Irregularities due to Photon-Axionlike-Particle Oscillations with the *Fermi* Large Area Telescope”, 2016, *Physical Review Letters*, 116p, 1101A, [2016PhRvL.116p1101A], [Journal Article].

26. Ackermann, M. et al. include **Li, L.**; “Resolving the Extragalactic -Ray Background above 50 GeV with the *Fermi* Large Area Telescope”, 2016, *Physical Review Letters*, 116o, 1105A, [2016PhRvL.116o1105A], [Citations (115)], [Journal Article].

27. Ackermann, M. et al. include **Li, L.**; “Measurement of the high-energy gamma-ray emission from the Moon with the *Fermi* Large Area Telescope”, 2016, *Physical Review D*, 93h2001A,

[2016PhRvD..93h2001A], [Journal Article].

28. Acero, F. et al. include **Li, L.**; “Development of the Model of Galactic Interstellar Emission for Standard Point-source Analysis of *Fermi* Large Area Telescope Data”, 2016, *The Astrophysical Journal Supplement Series*, 223, 26A, [2016ApJS..223...26A], [Citations (242)], [Journal Article].

29. Ajello, M. et al. include **Li, L.**; “Deep Morphological and Spectral Study of the SNR RCW 86 with *Fermi*-LAT”, 2016, *The Astrophysical Journal*, 819, 98A, [2016ApJ...819...98A], [Journal Article].

30. Ackermann, M. et al. include **Li, L.**; “Search for Gamma-Ray Emission from the Coma Cluster with Six Years of *Fermi*-LAT Data”, 2016, *The Astrophysical Journal*, 819, 149A, [2016ApJ...819..149A], [Journal Article].

31. Ajello, M. et al. include **Li, L.**; “*Fermi*-LAT Observations of High-Energy Gamma-Ray Emission toward the Galactic Center”, 2016, *The Astrophysical Journal*, 819, 44A, [2016ApJ...819...44A], [Citations (278)], [Journal Article].

32. Ackermann, M. et al. include **Li, L.**; “Deep view of the Large Magellanic Cloud with six years of *Fermi*-LAT observations”, 2016, *Astronomy and Astrophysics*, 586A, 71A, [2016A&A...586A..71A], [Journal Article].

33. Ackermann, M. et al. include **Li, L.**; “2FHL: The Second Catalog of Hard *Fermi*-LAT Sources”, 2016, *The Astrophysical Journal Supplement Series*, 222, 5A, [2016ApJS..222....5A], [Citations (199)], [Journal Article].

34. Ackermann, M. et al. include **Li, L.**; “An extremely bright gamma-ray pulsar in the Large Magellanic Cloud”, 2015, *Science*, 350, 801F, [2015Sci...350..801F], [Journal Article].

35. Ackermann, M. et al. include **Li, L.**; “Searching for Dark Matter Annihilation from Milky Way Dwarf Spheroidal Galaxies with Six Years of *Fermi* Large Area Telescope Data”, 2015, *Physical Review Letters*, 115w, 1301A, [2015PhRvL.115w1301A], [Citations (821)], [Journal Article].

36. Ackermann, M. et al. include **Li, L.**; “Multiwavelength Evidence for Quasi-periodic Modulation in the Gamma-ray Blazar PG 1553+113”, 2015, *The Astrophysical Journal Letters*, 813L, 41A,

[2015ApJ...813L..41A], [Journal Article].

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37. Ackermann, M. et al. include **Li, L.**; “Search for extended gamma-ray emission from the Virgo galaxy cluster with *Fermi*-LAT”, 2015, *The Astrophysical Journal*, 812, 159A, [2015ApJ...812..159A], [Journal Article].

38. Ackermann, M. et al. include **Li, L.**; “The Third Catalog of Active Galactic Nuclei Detected by the *Fermi* Large Area Telescope”, 2015, *The Astrophysical Journal*, 810, 14A, [2015ApJ...810...14A], [Citations (421)], [Journal Article].

39. C. J. Clark et al. include **Li, L.**; “PSR J1906+0722: An Elusive Gamma-ray Pulsar”, 2015, *The Astrophysical Journal Letters*, 809L, 2C, [2015ApJ...809L...2C], [Journal Article].

40. Ackermann, M. et al. include **Li, L.**; “Search for Early Gamma-ray Production in Supernovae Located in a Dense Circumstellar Medium with the *Fermi* LAT”, 2015, *The Astrophysical Journal*, 807,169A, [2015ApJ...807..169A], [Journal Article].

41. Wang, Xiang-Gao; Zhang, Bing; Liang, En-Wei; Gao, He; **Li, Liang**; Deng, Can-Min; Qin, Song-Mei; Tang, Qing-Wen; Kann, D. Alexander; Ryde, Felix; Kumar, Pawan, “How Bad or Good Are the External Forward Shock Afterglow Models of Gamma-Ray Bursts?”, 2015, *The Astrophysical Journal Supplement Series*, 219, 9W, [2015ApJS..219....9W], [Journal Article].

42. Ackermann, M. et al. include **Li, L.**; “Updated search for spectral lines from Galactic dark matter interactions with pass 8 data from the *Fermi* Large Area Telescope”, 2015, *Physical Review D*, 9112002A,[2015PhRvD..9112002A], [Citations (232)], [Journal Article].

43. Acero, F. et al. include **Li, L.**; “*Fermi* Large Area Telescope Third Source Catalog”, 2015, *The Astrophysical Journal Supplement Series*, 218, 23A, [2015ApJS..218...23A], [Citations (1264)], [Journal Article].

44. **Liang Li**, Xue-Feng Wu, Yong-Feng Huang, Xiang-Gao Wang, Qing-Wen Tang, Yun-Feng Liang, Bin-Bin Zhang, Yu Wang, Jin-Jun Geng, En-Wei Liang, Jian-Yan Wei, Bing Zhang, and Felix Ryde, “A Correlated Study of Optical and X-ray Afterglows of GRBs”, 2015, *The Astrophysical Journal*, 805, 13L, [2015ApJ...805...13L], [Journal Article].

45. Geng, J. J.; Wu, X. F.; **Li, Liang**; Huang, Y. F.; Dai, Z. G., “Revisiting the Emission from Relativistic Blast Waves in a Density-jump Medium”, 2014, *The Astrophysical Journal*, 792, 31G, [2014ApJ...792...31G], [Journal Article].
46. Kovacevic, M.; Izzo, L.; Wang, Y.; Muccino, M.; Della Valle, M.; Amati, L.; Barbarino, C.; Enderli, M.; Pisani, G. B.; **Li, L.**, “A search for *Fermi* bursts associated with supernovae and their frequency of occurrence”, 2014, *Astronomy and Astrophysics*, 569, A108, [2014A&A...569A.108K], [Journal Article].
47. Xiang-Gao Wang, En-Wei Liang, **Liang Li**, Rui-Jing Lu, Jian-Yan Wei, Bing Zhang, “A Comprehensive Study of Gamma-Ray Burst Optical Emission:III. Brightness Distributions and Luminosity Functions of Gamma-Ray Burst Optical Afterglows”, 2013, *The Astrophysical Journal*, 774, 132, [2013ApJ...774..132W], [Journal Article].
48. En-Wei Liang, **Liang Li**, He Gao, Bing Zhang, Qing-Wen Tang, Jie-Min Chen, Hou-Jun Lu, Jin Zhang, Shuang-Xi Yi, Zi-Gao Dai, Rui-Jing Lu, Lian-Zhong Lu, and Jian-Yan Wei, “A
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Comprehensive Study of Gamma-Ray Burst Optical Emission: II. Afterglow Onset and Late Re-Brightening Components”, 2013, *The Astrophysical Journal*, 774, 13, [2013ApJ...774...13L], [Journal Article].
49. **Liang Li**, En-Wei Liang, Qing-Wen Tang, Jie-Min Chen, Shao-Qiang Xi, Hou-Jun Lu, Bing Zhang, Jin Zhang, Shuang-Xi Yi, Rui-Jing Lu, Lian-Zhong Lu, and Jian-Yan Wei, “A Comprehensive Study of Gamma-Ray Burst Optical Emission. I. Flares and Early Shallow-decay Component”, 2012, *The Astrophysical Journal*, 758, 27, [2012ApJ...758...27L], [Journal Article].

Wu Yuanbin



January 2022

Position: PhD student

Period covered: 2011-2014

Current Position: Postdoc

Max Planck Institute for Nuclear Physics,
Heidelberg, Germany
2014-Now

I Scientific Work

Work in collaboration with ICRA Net during my PhD studies:

- Surface properties of the core-crust interface of neutron stars with global charge neutrality. The strong, weak, electromagnetic, and gravitational interactions are included in this neutron star model.
- Surface properties of compressed, superheavy atoms.
- The Einstein-Euler-Heisenberg (EEH) theory and charged black holes in the EEH theory. In the EEH theory, the one-loop nonperturbative QED effects of strong fields described by the Euler-Heisenberg effective Lagrangian is involved.
- Generalized Breit-Wheeler process of electron-positron pair production in the collision of a probe photon with two plane waves.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

List of Publication

- Yuanbin Wu, Simone Gargiulo, Fabrizio Carbone, Christoph H. Keitel, Adriana Pálffy, *Dynamical control of nuclear isomer depletion via electron vortex beams*, arXiv: 2107.12448.
- David Elsing, Adriana Pálffy, Yuanbin Wu, *Quantum effects on plasma screening for thermonuclear reactions in laser-generated plasmas*, arXiv: 2103.13311.
- Paul Hill, Yuanbin Wu, *Exploring laser-driven neutron sources for neutron capture cascades and the production of neutron-rich isotopes*, Phys. Rev. C 103, 014602 (2021).
- Yuanbin Wu, *Neutron production from thermonuclear reactions in laser-generated plasmas*, Phys. Plasmas 27, 022708 (2020).
- Yuanbin Wu, Christoph H. Keitel, Adriana Pálffy, *X-ray-assisted nuclear excitation by electron capture in optical laser-generated plasmas*, Phys. Rev. A 100, 063420 (2019).
- Yuanbin Wu, Christoph H. Keitel, Adriana Pálffy, *^{93m}Mo isomer depletion via beam-based nuclear excitation by electron capture*, Phys. Rev. Lett. 122, 212501 (2019).
- Jonas Gunst, Yuanbin Wu, Christoph H. Keitel, Adriana Pálffy, *Nuclear excitation by electron capture in optical-laser-generated plasmas*, Phys. Rev. E 97, 063205 (2018).
- Yuanbin Wu, Jonas Gunst, Christoph H. Keitel, Adriana Pálffy, *Tailoring laser-generated plasmas for efficient nuclear excitation by electron capture*, Phys. Rev. Lett. 120, 052504 (2018).
- Yuanbin Wu, Adriana Pálffy, *Determination of plasma screening effects for thermonuclear reactions in laser-generated plasmas*, Astrophys. J. 838, 55 (2017).

- Jonas Gunst, Yuanbin Wu, Naveen Kumar, Christoph H. Keitel, Adriana Pálffy, *Direct and secondary nuclear excitation with x-ray free-electron lasers*, Phys. Plasmas 22,112706 (2015).
- Yuan-Bin Wu, *On the surface tension and Coulomb energy of neutron star matter*, J. Korean Phys. Soc. 65, 850 (2014) [Special Issue on The 13th Italian-Korean Symposium on Relativistic Astrophysics].
- Yuan-Bin Wu, She-Sheng Xue, *Nonlinear Breit-Wheeler process in the collision of a photon with two plane waves*, Phys. Rev. D 90, 013009 (2014).
- Jorge A. Rueda, Remo Ruffini, Yuan-Bin Wu, She-Sheng Xue, *Surface tension of the core-crust interface of neutron stars with global charge neutrality*, Phys. Rev. C 89, 035804 (2014).
- Remo Ruffini, Yuan-Bin Wu, She-Sheng Xue, *Einstein-Euler-Heisenberg Theory and Charged Black Holes*, Phys. Rev. D 88, 085004 (2013).
- Yuquan Wu, Xiaofei Wang, Yuanbin Wu, *et al.*, *Properties of localization in silicon-based lattice periodicity breaking photonic crystal waveguides*, AIP Advances 3, 112107 (2013).
- Guo-Zhu Ning, Yuan-Bin Wu, *Neutrino Mass from a Higher-Dimensional Operator*, Chin. Phys. Lett. 28, 061402 (2011).
- Y. B. Wu, Y. F. Wang, and X. W. Cao, *On the enhanced Raman scattering of the nanosize semiconductor: A couple of cylinders (silicon and silver)*, J. Appl. Phys. 106, 053106 (2009).
- Y. B. Wu, Y. F. Wang, and X. W. Cao, *Theoretical study of enhanced Raman scattering for stratified concentric silicon-silver nanocylinders*, J. Appl. Phys. 105, 023103 (2009).

CAPES

Zen Vasconcellos, César Augusto



Position: Full Professor (Universidade Federal do Rio Grande do Sul (UFRGS),

Adjoint professor (ICRANet)

Period covered: 2021

I Scientific Work

Research on cosmology and nuclear astrophysics

II Conferences and educational activities

- XXI Meeting of Physics 2021 16-18 December 2021, Cusco. Peru Member of the International Organizing Committee and the International Organizing Committee
- *Sixteenth Marcel Grossmann Meeting - MG16 Virtual Meeting - July 5-10, 2021 Member of the International Coordinating Committee*
- *Sixteenth Marcel Grossmann Meeting - MG16 Virtual Meeting - July 5-10, 2021 Chair of the Parallel Session: Compact Stars as Laboratories for Testing Strong Gravity*

II b Work With Students

II c Diploma thesis supervision: Advisor of the following students:

- 1) Fábio Köpp Nóbrega, 2) Vinicius Medeiros Gomes da Silveira e 3) João Vitor BaBsta Vanazzi 4) Benno Bodmann.

III. Service activities [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*] III a.

Within ICRANet III b.

Outside ICRANet IV. Other 2021

List of Publication

1. SILVEIRA, V. M. G. ; VASCONCELLOS, C. A. Z. ; LUNA, E. G. S. ; HADJIMICHEF, D. . Matter-antimatter asymmetry and non-inertial effects. JOURNAL OF HIGH ENERGY PHYSICS , v. 2021, p. 285, 2021.

2. SILVEIRA, VINICIUS M. G. ; VASCONCELLOS, C. A. Z. ; LUNA, EMERSON G. S. ; HADJIMICHEF, D. . Noninertial effects on CP - violating systems. ASTRONOMISCHE NACHRICHTEN , v. 342, p. 352-356, 2021.

3. RAZEIRA, MOISÉS ; KÖPP, FABIO ; VOLKMER, GUILHERME ; MACHADO, MAGNO ; HADJIMICHEF, DIMITER ; ZEN VASCONCELLOS, CÉSAR A. . Equation of state of strange stars with admissible dark matter: Derivation from galactic rotational curves. ASTRONOMISCHE NACHRICHTEN , v. 342, p. 310-314, 2021. Citações: 1

4. GAMARRA, MILTON ROJAS ; GULLBERG, STEVEN R. ; ESTRÁZULAS, MÔNICA ; HORVATH, JORGE ; ZEN VASCONCELLOS, CÉSAR A. . Inka's cosmovision, space, time, and Cosmos: A Western perspective. ASTRONOMISCHE NACHRICHTEN , v. 342, p. 31-38, 2021.

5. ZEN VASCONCELLOS, CÉSAR A.; HESS, PETER O. ; HADJIMICHEF, DIMITER ; BODMANN, BENNO ; RAZEIRA, MOISÉS ; VOLKMER, GUILHERME L. . Pushing the limits of time

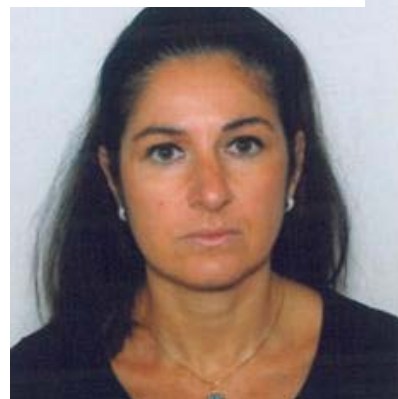
beyond the Big Bang singularity: Scenarios for the branch cut universe. ASTRONOMISCHE NACHRICHTEN , v. 1, p. asna.202113993, 2021.

6. ZEN VASCONCELLOS, CÉSAR A.; HESS, PETER O. ; HADJIMICHEF, DIMITER ; BODMANN, BENNO ; RAZEIRA, MOISÉS ; VOLKMER, GUILHERME L. . Pushing the limits of time beyond the Big Bang singularity: The branch cut universe. ASTRONOMISCHE NACHRICHTEN , v. 1, p. asna.202113992, 2021.

7. ZEN VASCONCELLOS, CÉSAR A.; HESS, PETER O. ; PICCINELLI, GABRIELLA ; MAGAÑA, MARIANA VARGAS ; UREÑA'LOPEZ, LUIS ; FELIPE, RICARDO GONZALEZ ; BOLLER, THOMAS ; GULLBERG, STEVEN . Special volume - 9th International Workshop on Astronomy and Relativistic Astrophysics: From Quarks to Cosmos. ASTRONOMISCHE NACHRICHTEN , v. 1, p. asna.202113986, 2021. Editors. .

Administrative, Secretarial and Technical Staff

Adamo Cristina



E mail address	cristina.adamo@icranet.org
Telephone	+39 085 23054205
Fax	+39 085 4219252
Nationality	Italian
Date and place of birth	Vibo Valentia, 12 December 1972
<u>Work experiences</u>	
Date	09 November 2009 → present
Name of employer	ICRANet - International Center for Relativistic Astrophysics Network
Main activities and responsibilities	Administrative employee Administrative office: accountancy, preparing reimbursement and rewards for scientific visitors, on – line payments, analysis of bank statements.
Date	04 March 2007 → 09 October 2009
Occupation or position held	Head Administrative Office
Main activities and responsibilities	Account and budget General Account. Active and passive billing cycles. Bank settlement. Treasury management and bank relations management. RI.BA. emission. Down-payment and invoice discount management. Payment and takings management. Independent management of the main civil-fiscal fulfilments with a particular attention to the periodical settling and vat statement. General account management. Assets management. Arrangement INTRA model. Arrangement of the financial year ending. Reclassification of the budget. Management of the accounting plan. Implementation of new instruments aiming at improving the efficiency of the administrative services. Administrative management of the staff: recruitment and selection interviews, drawing up of mandatory documents (matriculation and presences books), elaboration of timesheets. Management of clients and suppliers' order. Purchase and choice of suppliers to be qualified. Prices definition, deposit and shipment management.
Name and address of employer	Solaris Srl - Manoppello (PE) - Industrial Springs Production
Date	01 April 2001 - 28 January 2004

Occupation or position held	Responsible for marketing planning
Main activities and responsibilities	Evaluation of markets perspective. Coordination and reduction of commercial plans. Survey of the competition sale prices Coordination of marketing plans and commercial budgets
Name and address of employer	Merker SpA - Trucks production
Date	1997 - 2000
Title of qualification awarded	Trainee at a Business Consultant
Principal subjects / occupational skills covered	Ordinary and simplified account. Fiscal fulfilments. European balance. Income tax return. Consultant office Dott. Vincenzo Micozzi - Pescara
Date	1997 - 31/03/2001
Principal subjects / occupational skills covered	Responsible for Quality Insurance (ISO UNI EN 9002) Management Assistance Purchase management Administrative and fiscal fulfilments Definition of Marketing plans and monitoring of mix marketing elements
Name and address of employer	Solaris Srl - Industrial Springs production
Date	1997 - 1997
Occupation or position held	Stageur
Main activities and responsibilities	Implementation of check systems management
Name and address of employer	Software House Polymatic - Chieti Scalo
<u>Education and training</u>	
Date	November 1991 - 16 July 1996
Title of qualification awarded	Degree in Economics – Economics of financial middleman
Name and type of organisation providing education and training	University L.U.I.S.S. - Guido Carli – Roma – Final marks: 105/110 – Thesis: “Tax incentive for the occupational development”
Dates	1986 - 1991
Title of qualification awarded	Secondary School Degree
Name and type of organisation providing education and training	Liceo Scientifico Leonardo Da Vinci - Pescara

Dates	1997 - 2000
Title of qualification awarded	Trainee at a Business Consultant
Main Subjects	Ordinary and simplified account. Fiscal fulfilments. European balance. Income tax return.
Name and type of organisation providing education and training	Consultant office Dott. Vincenzo Micozzi - Pescara
Date	1998 - 1998
Title of qualification awarded	Brief Master on Tax Law
Name and type of organisation providing education and training	University D'Annunzio - Pescara
Date	1998 - 1998
Title of qualification awarded	Postgraduate Course on “ European Union: institutional, juridical and economic aspects”
Name and type of organisation providing education and training	European Commission and University of Lyon: corse in Paris and Lyon. Success on final exams.
Dates	1997 - 1997
Title of qualification awarded	Expert in enterprise management
Main Subjects	Purchase and logistics, financing, administration and control, marketing, production, budget, bringing out of new products
Name and type of organisation providing education and training	Regione Abruzzo - CIFAP
Dates	1997 - 1997
Title of qualification awarded	Evaluator of Quality systems
Main subjects	Expert according to the ISO regulations. Qualification for leading controls according to the UNI EN 9002 regulations.
Personal skills and competences	
Mother tongue	Italian
<i>English</i>	Indipendent User

	<i>French</i>	Basic User
Social skills and competences		<p>Communication Ability acquired during the working experiences</p> <p>Aptitude to learn, adaptable to new situations, different from the known ones.</p> <p>Ability to work under pressure.</p> <p>Good aptitude to work in multicultural environment thanks to the experiences spent abroad for education or personal reasons.</p> <p>Team spirit</p>
Organisational skills and competences		<p>Innate sense of organisation both in the working place and in the management of personal and familiar life.</p> <p>I am considered as a reference point by the production operators.</p>
Technical skills and competences		<p>Mastery in quality control processes in small enterprises (I was responsible for the quality evaluation)</p>
Computer skills and competences		<p>Good Knowledge of Microsoft Office (Word, Excel e PowerPoint)</p> <p>Very good knowledge of Team System – Gamma, Mult program</p> <p>Basic knowledge of graphic application</p> <p>Good knowledge of Internet and web search engines.</p>

ANIELLO FRANCESCO IZZO

Nato a Torre Annunziata (NA) il 24.02.1939 e residente in Roma, via Domenico Oliva, 7 (00137), coniugato senza figli, servizio militare esente.

Titoli di studio

Nel 1962 diploma di Laurea in Economia e Commercio presso l'Università degli Studi di Napoli con votazione finale di 94/110. Diploma di maturità classica.

Esperienze di lavoro

Nel 1970 vincitore di concorso quale segretario presso il Ministero del Tesoro (Direzione Provinciale del Tesoro).

Nel 1972 vincitore di concorso presso il Ministero del Tesoro – Ragioneria Generale dello Stato- ed assegnato col grado di consigliere all'Ispettorato Generale per gli Affari Generali del Personale e degli Studi – I.G.A.G. Dir. V (Ufficio concorsi, assegnazioni e trasferimenti).

Nel 1975 nominato direttore di sezione nel medesimo Ufficio. In tale periodo ha partecipato, quale segretario, ad alcuni concorsi pubblici per il reclutamento di personale.

Nel 1979 assegnato all'Ispettorato Generale per gli Affari Economici, I.G.A.E. – Div. X (Rapporti con Organismi internazionali diversi dalle Comunità Economiche Europee; accordi internazionali; cooperazione con i paesi in via di sviluppo).

Nel 1981 nominato direttore aggiunto di divisione nell'indicato Ufficio. In tale periodo ha partecipato, quale rappresentante del Tesoro a numerosi Gruppi di lavoro in ambito Cee, OCSE e UNCTAD in materia di Accordi internazionali sui prodotti di base.

Rappresentante del Tesoro ai lavori della Commissione per le questioni amministrative, finanziarie e di bilancio della Assemblea Generale delle Nazioni Unite (Va commissione) negli anni dal 1983 al 1988.

Rappresentante italiano in seno ai comitati Bilancio e/o Finanziari (OMS, IMO, Fondo Internazionale Indennizzi danni da inquinamento da idrocarburi, OMM, UNESCO, CIM, OEB, ILO, GATT, UNDP, CEPMMT, IUE).

Dal gennaio 1995 ha svolto le funzioni di dirigente nella indicata divisione ed ha seguito le problematiche connesse alle fasi prelegislativa, legislativa ed attuativa di provvedimenti normativi diramati dal Ministero degli Affari Esteri.

Ha svolto, altresì, diversi incarichi di Revisore in sede nazionale. In ambito internazionale ha partecipato alle riunioni dei Comitati Finanza presso gli Organismi scientifici internazionali (LEBM, CERN, in sede Europa), ICTP, ICGEB in sede Nazioni Unite.

Collocato a riposo nell'anno 2006, ha svolto le funzioni di Revisore esterno dei conti dell'ICRANet, per il biennio 2006-2007 (nominato dal Comitato di Direzione dal settembre 2005).

Dall'anno 2008 svolge le funzioni di collaboratore dell'ICRANet nei rapporti con i Ministeri nazionali ed internazionali e nella consulenza in materia di rendicontazione e dei programmi internazionali

Brandolini Gabriele



First name	Gabriele Attilio
Surname	Brandolini
E-mail address	gabriele.brandolini@icranet.org
Telephone	+39 085 23054203
Fax	+39 085 4219252
Nationality	Italian
Place and date of birth	Ortona (CH), 22 April 1986

Work experiences

Date	01 July 2013 - present
Name of employer	Soabit srl c/o ICRA Net - International Center for Relativistic Astrophysics Network
Kind of Employment	System manager

Main activities and responsibilities	Network administrator – Web development
Date	2011 - 2011
Name of employer	Tipografia F.lli Brandolini snc
Kind of Employment	Graphic designer
Main activities and responsibilities	Network administrator Graphic design and layout texts
Date	2010-2010
Name of employer	Soabit srl c/o Univesità degli Studi “G. d'Annunzio” - Chieti
Kind of Employment	Help desk
Main activities and responsibilities	Web development: analysis and development of applications for managing stock of average complexity using PHP and MySQL technologies. Network administrator: support to the installation of network devices and updating of its firmware, to the segmentation of local area network (VLAN 802.1q) and support to troubleshooting activities. Network management: implementation of procedures for the historicizing of traffic flows (NetFlow / PMAcct) generated by the various firewalls on the various local networks.
Date	2009 - 2009
Name of employer	Tipografia F.lli Brandolini snc
Kind of Employment	Graphic designer
Main activities and responsibilities	Network administrator Graphic design and layout texts

Education

Date	September 2005 – 18 December 2012
Title of qualification awarded	Degree in Computer Science
Name and type of organisation providing education and training	University of L'Aquila – Final marks: 88/110 Thesis: “Analisi di prestazioni dell'instradamento in reti di sensori wireless”

Dates	September 2009 – July 2005
Title of qualification awarded	Secondary School Degree
Name and type of organisation providing education and training	Istituto Tecnico Industriale Statale “Luigi di Savoia” - Chieti
<u>Personal skills and competences</u>	
Mother tongue	Italian
<i>English</i>	Basic User
Social skills and competences	Ability to work in a team matured in many situations where it was necessary collaboration between the figures, both in academia and in the business and sports. Good relational abilities thanks to the past work experience.
Organisational skills and competences	Sense of organization Good experience in project and team management
Computer skills and competences	Excellent knowledge of Operating Systems: Windows, Mac OS X and Linux. Excellent knowledge of Apple and Microsoft applications and Microsoft Office. Excellent knowledge, also, of various graphics and layout software. Excellent ability to use the Internet and manage applications that use them. Management of Local Area Networks LAN and WLAN and implementation of web applications. Excellent knowledge of HTML, PHP, CSS, Javascript, jQuery, MySQL. Good knowledge of C, C++, Java, VPN, Firewalling.
Other skills and competences	Considerable passion for the sport, followed and practiced.
Driving licence	Driving licence cat. A – B.

Yasmina Di Domizio



ESPERIENZE LAVORATIVE

10/2021 – presente **Segretaria in ICRANet**

09/2020 – 10/2021 **Coordinatrice delle attività didattiche, corsi, seminari, convegni, eventi di formazione online** presso Assform.

- Attività di back office, gestione casella di posta, gestione dei rapporti B2C e con i docenti, supporto nell'utilizzo della piattaforma e-learning, follow-up degli eventi di formazione online. Predisposizione reportistica delle presenze e del materiale didattico/test/verifiche. Attivazione e governo delle attività didattiche. Promozione dei corsi. Redazione di testi digitali, elaborazione di video.

02/2020 – 06/2021 **Insegnante di inglese**

09/2018 – 01/2019 **Assistente** nei laboratori multimediali del Centro Linguistico Ateneo dell'Università di Bologna. Assistenza e sorveglianza durante gli esami e le idoneità linguistiche, registrazione degli utenti, controllo e gestione degli accessi nei laboratori e supporto informativo.

FORMAZIONE

08/2020 – 02/2021 Master in *Global Marketing, Comunicazione e Made in Italy*, Centro Studi Comunicare l'Impresa.

Moduli didattici: Incoterms 2020 e i pagamenti internazionali; La circolazione internazionale delle merci; Principi di Marketing; Internazionalizzazione e Marketing; Comunicazione e Social media; E-commerce.

09/2017 – 03/2020 Laurea magistrale in Lingue moderne per la comunicazione e la cooperazione internazionale (*Language, Society and Communication*) presso l'Università di Bologna conseguita con votazione di 110/100 e lode. Tesi in traduzione inglese → *Translating Popular Science: The Cases of National Geographic and Scientific American*.

09/2013 – 03/2017 Laurea triennale in *Mediazione Linguistica e Comunicazione Interculturale* presso l'Università di Chieti-Pescara conseguita con votazione di 110/100 e lode.

07/2013 Diploma di maturità conseguito presso il liceo linguistico GB Vico di Sulmona (AQ) con votazione 100.

STUDI ED ESPERIENZE ALL'ESTERO

04/2017 – 06/2017 Corso di francese B2 presso il centro studi Inflexyon a Lione.

04/2017 – 06/2017 Adesione al progetto interculturale *Au Pair World* presso una famiglia franco-messicana a Lione.

09/2015 – 07/2016 Erasmus presso l'Università di Warwick (Gran Bretagna). Frequenza di corsi di traduzione EN<>IT, EN<>ES, Letteratura inglese.

LINGUE

	Listening	Speaking	Reading	Writing
Inglese (IELTS certificate)	C2	C1	C2	C1
Spagnolo	C2	C1	C2	C1
Francese	B2	B2	B2	B1

ABILITÀ INFORMATICHE

- Buona conoscenza del sistema operativo Windows e degli applicativi Office (Word, Excel, Power Point). Ottima conoscenza di programmi di posta elettronica (Outlook, Gmail, Thunderbird). Conoscenza base di OBS Studio, di video editing e di strumenti di progettazione grafica (Canva).

Di Niccolo Cinzia

E mail address cinzia.diniccolo@icranet.org
Telephone +39 085 23054 219
Fax +39 085 4219252
Nationality Italian
Date and place of birth Terlizzi, 23 May 1985



Work experiences

Date	01 August 2013 → present
Name of employer	ICRANet - International Center for Relativistic Astrophysics Network
Main activities and responsibilities	Secretariat Office
Date	12 June → 16 July 2013
Occupation or position held	ISTAO – Project Work
Main activities and responsibilities	Report And Presentation Of The Results Loccioni Group – Our Presence In The World: Germany, USA, China; Country Analysis: Turkey. Results, Report And Final Slide Presentation To Loccioni Managers
Name and address of employer	Loccioni Group, via Fiume 16, 60030 Angeli di Rosora, Ancona Phone +39.0731.8161 Fax +39.0731.814.700
Date	From October 2012
Occupation or position held	Conference interpreting and translations.
Name and address of employer	OS-Card Srl – Bologna
Date	May 2012 → September 2012
Occupation or position held	Junior Export Manager
Main activities and responsibilities	Brazil country analysis. Brazilian Portuguese website translation. Company profile in Brazilian Portuguese language.
Name and address of employer	Marzoarreda – Novoli (LE)

Date September 2011 → January 2013
 Occupation or position held Stageur
 Main activities and responsibilities Legal Office – Notary services
 Drafting of documents concerning: general/special power of attorney, will and testament of citizens living abroad, public acts, certificates of authentications, self-certifications and official certificates that can be replaced by self-certifications.
 Name and address of employer Italian General Consulate in Brazil – São Paulo
 Aveinda Paulista, 1963; CEP 01311-300 São Paulo (SP)

Date October 2011 → January 2012
 Occupation or position held Italian teacher
 Main activities and responsibilities Italian teacher for native Brazilian students.
 Private lessons and classes.
 Conference interpreter for 30th São Paulo *Venice Architecture Biennial* 2012
 Name and address of employer Italian Institute of Culture in Brazil – São Paulo
 Avenida Higienópolis, 436; CEP 01238-000, São Paulo (SP)

Date January → July 2011
 Occupation or position held Internship
 Main activities Editing, proofreading.
 Name and address of employer Edizioni dell'Urogallo – Literature from Portuguese-speaking countries

Education and training

Date February → July 2013
 Title of qualification awarded Postgraduate master course in International Management

Name and type of organisation providing education and training	ISTAO – Istituto Adriano Olivetti di Studi per la gestione dell'economia e delle aziende The Masters Course in International Management prepares highly specialized students in the field of international business and trade. Organized in collaboration with ICE (Governmental Agency for the internationalization of Italian companies), Confindustria Marche (Italian Employers' federation) and the Government of the Marche Region, the Master represents one of the most important and valuable programs for new graduates approaching the business world focused on the themes of internationalization: macroeconomics and global markets, enterprise organization, emerging countries, strategies and decision-making skills, contracts, rules, techniques.
Date	May 2012
Title of qualification awarded	CEDILS Certificate Certified teacher for Italian as foreign language
Name and type of organisation providing education and training	Ca' Foscari – University of Venice
Date	November 2008 → 11 July 2011
Title of qualification awarded	Master degree in <i>Languages for international communication – Portuguese EU/BR and Spanish</i>
Name and type of organisation providing education and training	Univerità degli Studi di Perugia Final marks: 110/110 cum laude Thesis: "Way to Europe. Portugal and the European integration process"
Date	November – December 2010
Title of qualification awarded	Brief Master on Europroject Management 2007-2013
Name and type of organisation providing education and training	Introduction to European Union: institutional, juridical and economic aspects. Training courses: full lifecycle of an EC funded project: proposal preparation and submission, evaluation, negotiation, technical and financial project management, reporting, technical reviews and post-project audits.
Date	November 2004 → 9 November 2008
Title of qualification awarded	Degree in <i>Linguistic and Cultural Mediation Sciences – Portuguese EU/BR and Spanish</i>
Name and type of organisation providing education and training	Univerità degli Studi di Perugia Final marks: 110/110 cum laude Thesis: Modern poetry in Portugal.

Dates	1999 - 2004
Title of qualification awarded	Secondary School Degree
Name and type of organisation providing education and training	Liceo Linguistico Carlo Troya – Andria (BT)

Personal skills and competences

Mother tongue	Italian
<i>Portuguese</i>	Second language
<i>Spanish</i>	Very good
<i>English</i>	Good
<i>French</i>	Basic User

<u>Social skills and competences</u>	Good ability to adapt to multicultural environment, gained through my experience of studying and travelling abroad (Brazil and Europe); Very good aptitude in teamwork (working within collective projects in the postgraduate course and in academia); Ability to work under pressure.
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<u>Organisational skills and competences</u>	Very good sense of organisation and time planning abilities; Self rigorousness and self discipline; Good analytical and problem-solving abilities gained during all study years and especially during internship at Italian General Consulate in Brazil (the Vice-Consul signed my letter of recommendation)
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<u>Computer skills and competences</u>	Very good command of Microsoft Office (Word, Excel e PowerPoint); Very good knowledge of Internet and web search engines; Knowledge of graphic application.
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PERSONAL INFORMATION

Place and date of birth Chieti, 23/09/1982
Nationality Italian
E- mail silvia.latorre@icranet.org
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Fax 085 - 4219252

WORK EXPERIENCES

- Date 12/02/2008 – present
- Name of employer ICRANet
 - Firm or Sector International Center for Relativistic Astrophysics Network
- Kind of Employment Administrative employee
 - Main Tasks Managing the relationship with suppliers, controlling invoices, calculating reimbursement and rewards for our scientific visitors, preparing orders for the bank, executing and verifying on-line payments, meeting our bank referents for particular payment operations, cashholding, using ICRANet cost-accounting system.
- Date 01/12/2006 – 20/01/2008
- Name of employer DelVerde Industrie Alimentari S.p.A.
 - Firm or Sector Pasta Factory
- Kind of Employment Trainee
 - Main Tasks Study and analysis of annual financial statements of ten competitor pasta factories for the financial years from 2002 to 2006, as well as reclassification of balance sheets and profit and loss accounts and calculation of the main income and financial indexes. Analysis of export strategies of DelVerde and other Italian pasta factories.

EDUCATION


- Date 11/2005 – 12/2007
- Institution Università degli Studi “G. D’Annunzio” Pescara
- Main Subjects Marketing, commercial law, innovation management and economics, business statistics, quality technique and theory
- Achieved Qualification Degree in Economics and Administration of the enterprises. Final thesis in analysis of balance sheet: “*La leva finanziaria e la leva operative nel settore pastario*” (supervisor Prof. Michele A. Rea)
- Mark 110/110 *cum laude*

• Date	09/2001 – 11/2005
• Institution	Università degli Studi “G. D’Annunzio” Pescara
• Main Subjects	Financial Mathematics, bank technique, business economics, accountancy, microeconomics, macroeconomics, private and public law, work law, analysis of balance sheet, business strategy and politics
• Achieved Qualification	Business Economics Degree. Final thesis in business strategy and politics: “ <i>Gli strumenti di analisi strategica: l’analisi SWOT</i> ” (supervisor Prof. Michele A. Rea)
• Mark	106/110
• Date	09/1996 – 07/2001
• Institution	Secondary School focusing on sciences- Liceo Ginnasio Statale “Publio Virgilio Marone” Vico del Gargano (FG)
• Main Subjects	Mathematics analysis, Italian language and literature, Latin language and literature, Chemistry, Physics
• Achieved Qualification	Scientific school-leaving certificate
• Mark	100/100
FOREIGN LANGUAGES	ITALIAN
MOTHER-TONGUE	
OTHER LANGUAGES	ENGLISH (GOOD) – FRENCH (ELEMENTARY)
RELATIONAL ABILITIES	Good relational abilities thanks to the past work experience at DelVerde and to the present experience at ICRANet. Self-reliant. Good listener.
ORGANIZING COMPETENCES	Good organizing abilities acquired handling the big amount of data at DelVerde and working at ICRANet, where they are essential for managing the large number of guests, mainly during the meetings.
TECHNICAL SKILLS	Computers competences: Windows. Softwares: Word, Excel, Power Point. Very good use of Internet and e-mail accounts. Good use of cost-accounting system HELPAZI and bank system BNL Businessway. Elementary knowledge of HTML e CSS programs for websites. Knowledge of “TOP VALUE” program for financial diagnosis and corporate planning.
ARTISTIC SKILLS	Piano classes attended for 8 years. sol-fa Diploma.
DRIVING LICENCE	Driving licence cat. B
FURTHER INFORMATION	I like travelling, cooking, cinema, listening music, playing the piano. I have a determined, dynamic and flexible personality. I like staying and working with people.

INFORMAZIONI PERSONALI

Elisabetta Natale



 Via Cesare Battisti 12, 65029, Torre de' Passeri (PE)

Data di nascita 07/11/1991 | Nazionalità Italiana

ESPERIENZA PROFESSIONALE

Da 01/2018 →

ICRANet Secretariat
International Center for Relativistic Astrophysics Network (ICRANet), Pescara

Da 09/2017 a 12/2017 →

Europe and North America Desk Assistant
UNESCO, Parigi

Relazione con Stati membri e Partner istituzionali (MSP), settore Relazioni estere e Public information and communication (ERI)

Da 03/2017 a 09/2017

HR & Project Assistant Intern
INTERSOS, Roma

Da 08/2016 a 02/2017

Intern – Delegazione dell'Unione Europea presso Agenzie delle Nazioni Unite (FAO, IFAD, WFP), Santa Sede, Ordine di Malta e Repubblica di San Marino
EEAS (European External Action Service), Roma

- Sezione rapporti Unione Europea – ONU, in particolare responsabile delle relazioni UE - FAO
- Partecipazione ai principali meeting FAO in qualità di delegata UE
- Organizzazione e coordinamento dei meeting tra i 28 stati membri, analisi e preparazione di documenti e statement per i meeting
- Assistente sezione stampa e comunicazione, cura del sito web della Delegazione
- Stesura di comunicati stampa e report per gli uffici UE a Bruxelles, in particolare per la Commissione Europea e le DG pertinenti

Da 06/2016 a 08/2016

Marketing assistant
General Communication Srl Bologna, Bologna

- Ricerca e fidelizzazione di nuovi clienti per conto di ONGs e INGOs (AMNESTY INTERNATIONAL, UNICEF, AISM Onlus)
- Project Assistant

06/2016	<p>Exit poll e proiezioni elettorali per elezioni amministrative Bologna 2016 IPR marketing per conto di RAI radiotelevisione italiana spa, Bologna</p> <ul style="list-style-type: none"> ▪ Raccolta dati, monitoraggio, analisi e statistiche per proiezioni elettorali ▪ Trasmissione dei dati a RAI radiotelevisione italiana per immediata diffusione in tempo reale
04/2016	<p>Scrutatrice per il referendum popolare italiano del 17 aprile 2016 Comune di Torre de' Passeri (PE)</p>
Da 09/2015 a 11/2015	<p>Administrative assistant Intern Centro linguistico d'ateneo (CLA) Ravenna - Alma Mater Studiorum università di Bologna</p> <ul style="list-style-type: none"> ▪ Attività di front/ back office, traduttrice per gli studenti stranieri in arrivo ▪ Preparazione e correzione dei test di livello linguistici (inglese, francese, tedesco e spagnolo) ▪ Assistente all'insegnamento per il progetto "ALMA ENGLISH" e per le certificazioni linguistiche ▪ Assistente all'insegnamento della lingua italiana per studenti stranieri ▪ Assistente sezione comunicazione
Da 11/2013 a 04/2014	<p>Administrative assistant Intern Ufficio orientamento e career service Forlì, Alma Mater Studiorum università di Bologna, Campus di Forlì (FC)</p> <ul style="list-style-type: none"> ▪ Creazione e aggiornamento dei database ▪ Attività di front/ back office ▪ Colloqui con gli studenti per l'orientamento in entrata ed in uscita ▪ Promozione dell'attività formativa dell' Alma Mater Studiorum ▪ Assistente sezione comunicazione
Da 20/03/2014	<p>Co-founder associazione IAPSS sezione di Forlì IAPSS (International Association for Political Science Students), Forlì (FC)</p> <ul style="list-style-type: none"> ▪ Cofondatrice dell'associazione ▪ Presentazione di IAPSS a istituzioni accademiche e amministrative (Alma Mater Studiorum - UniBo, comune di Forlì, ...) ▪ Organizzazione di conferenze a livello locale / nazionale e internazionale ▪ Organizzazione di conferenze, eventi, round-tables, workshops, viaggi studio e di approfondimento ▪ Assistente sezione stampa e comunicazione
03/2010	<p>Traduttrice DE> IT del materiale informativo relativo al XXXVII Congresso nazionale su "KANTE L' AUFKLÄRUNG" Società filosofica italiana, Sulmona (L'AQ)</p> <p>Traduzione di discorsi, flyer, documenti e materiale informativo relativo al XXXVII Congresso nazionale della "KANTE L' AUFKLÄRUNG"</p>
ISTRUZIONE E FORMAZIONE	
02/2017	<p>Workshop in International Journalism and Communication The Post Internazionale and Limes, Roma (RM)</p>

Panelists: Enrico Mentana, Curzio Maltese, Marco Damilano, Amedeo Ricucci, Emiliano Fittipardi, Stefano Mentana, Giulio Gambino, Alessio Romenzi, Francesca Mannocchi, Nancy Porsia, Eva Giovannini, Sabika Shaha Povia, Laura Silvia Battaglia.

Da 04/2016 a 08/2016

Executive master in International Business Development (percorso Export management e internazionalizzazione d'impresa)

Sida group Management Academy, Bologna (BO)

Principali tematiche trattate: Strategie per l'internazionalizzazione d'impresa; marketing analitico e operativo; web marketing; social media marketing; project management; supply chain management e disciplina doganale; bilancio aziendale; controllo di gestione, pianificazione e strategia aziendale; business plan e finanziamenti; fiscalità e contrattualistica internazionale; tutela di marchi e brevetti; pagamenti internazionali e gestione del credito; analisi di mercato.

06/2016

Diploma congiunto NATO Allied commander transformation-UNIBO

NATO summer workshop and NATO Model event, Forlì (FC)

"NATO and Security Challenges: Institutions and Policies, Key Trends and Best Practices"

Ruolo ricoperto: giornalista NATO

Principali tematiche: Changing balances and the role of NATO in international politics: current challenges and future opportunities; NATO in the future; Cooperative Security: Nato Partnerships in Perspective; Collective Defence and Crisis Management – Art.5 and Beyond; NATO and Other Actors in the New Security Environment: NATO and the UN; NATO and the EU; Cybersecurity: Myth and Reality; The changing global security environment: Exploring new challenges and opportunities.

Da 09/2014 a 06/2015

Erasmus +

Institut d'études politiques (SCIENCES PO), Lione, Francia

Specializzazione nel percorso Affari internazionali e commerciali

Principali tematiche: Politique commerciale européenne et comparée; Pratiques du commerce international; Médias, pouvoir et construction du consensus politique ; Communication politique et publique; Théorie et pratiques de la diplomatie; Violence internationale et gestion des conflits; Politiques publiques; Histoire internationale.

Da 09/2013 a 03/2016

Laurea magistrale in scienze internazionali e diplomatiche Curriculum: politica e sicurezza internazionale

Votazione: 110 con lode /110

Alma Mater Studiorum università di Bologna, Campus di Forlì

Redazione della tesi sperimentale in lingua francese, dal titolo «*L'outrecuidance «à la française»: paradoxes stratégiques et ambiguïtés historiques de la politique européenne et de défense de la France*».

Attività extracurricolari:

- Co-fondatrice dell'associazione IAPSS (International Association For Political Science Students)
- 07/05/2014: SEMINAR "The Ukrainian Warfare: historical path and future implications to the International System" (organizzatrice)
- 11/04/2014: Incontro "Percorsi verso le carriere internazionali-da scienze politiche al mondo globale", Campus di Forlì
- 06/03/2014: simulazione del Consiglio dell'UE nella formazione Occupazione e Affari Sociali (Forlì) – Ruolo: Germania

Da 09/2010 a 07/2013

Laurea in scienze internazionali e diplomatiche

Alma Mater Studiorum università di Bologna, Campus di Forlì

Attività extracurricolari:

- 05/2013: NATO Model Event (Forlì) - Ruolo: Ambasciatrice della Lituania
- 10/05/2013: "Croatian Membership in the New Europe", conferenza con l'Ambasciatore croato in Italia, Damir Grubiša, Punto Europa (Forlì)
- 12/04/2013: incontro ISPI "GLOBE, orientamento alle carriere internazionali", Campus di Forlì
- 07/03/2013: "L'Emilia nel cuore dell'Europa. Emigrazione in Belgio. Storia e memorie di molte partenze e di qualche ritorno", presentazione del libro del professor Lorenzo Bertucelli, Punto Europa (Forlì)
- 02/2013: Prague Model United Nations Conference (Praga) - Ruolo: delegata della Mongolia nel Consiglio economico sociale Onu (ECOSOC)
- 13/03/2012: Cerimonia di consegna del Sigillum Magnum a Jean-Claude Juncker, Romano Prodi e Helmut Kohl, Bologna

Da 09/2005 a 07/2010

Maturità linguistica

Liceo linguistico Gian Battista Vico, Sulmona (L'AQ)

Lingue di studio: inglese, francese e tedesco

Scambi culturali:

- 10/2008: scambio culturale in Germania, liceo "Kurfurst Maximilian Gymnasium" Burghausen (Salzach)
- 03/2008: scambio culturale in Francia, liceo "Jean Zay", Jarmy (Lorraine)

COMPETENZE PERSONALI

Lingua madre
Altre lingue

Italiano

COMPRESIONE		PARLATO		PRODUZIONE SCRITTA
Ascolto	Lettura	Interazione	Produzione orale	
Inglese	C1/C2	C1/C2	C1/C2	C1/C2
Francese	C1/C2	C1/C2	C1/C2	C1/C2
Tedesco	B1/B2	B1/B2	B1/B2	B1/B2
Russo	B1	B1	B1	B1
Spagnolo	A2	A2	A2	A2

Competenza digitale

AUTOVALUTAZIONE				
Elaborazione delle informazioni	Comunicazione	Creazione di Contenuti	Sicurezza	Risoluzione di problemi
Utente intermedio	Utente intermedio	Utente intermedio	Utente intermedio	Utente intermedio

Altre competenze

- Corsi CRI (Pioniere e Volontaria del soccorso della Croce Rossa Italiana, corso BLS e abilitazione all'utilizzo del defibrillatore semi automatico esterno)
- Attività sportiva agonistica (Federazione italiana Pentathlon moderno_ società sportiva Valpescara srl)
- Educatrice in Azione Cattolica e accompagnatrice/organizzatrice di campi estivi parrocchiali
- Aiuto nel doposcuola parrocchiale e ripetizioni private (saltuariamente).
- Conoscenza del sistema di scrittura e di lettura Braille

Patente di guida

B

ULTERIORI INFORMAZIONI
Progetti

GENERAZIONE ITALIA - Progetto di formazione istituzionale e innovazione legislativa organizzato dalla FONDAZIONE CULTURA DEMOCRATICA e dal GOVERNO ITALIANO
Roma, 04-08/2017

Riconoscimenti e premi

- Luglio 2015: attestato di merito per studenti meritevoli, Alma Mater Studiorum Università di Bologna
- 11/12/2010: Borsa di studio per conseguimento del diploma con esito eccellente, elargita dal "Centro studi Mac 47, Carmine Mastrogiuseppe no profit", Sulmona (L'AQ)
- 08/2010: Segnalazione da parte del Dirigente Scolastico del liceo G.B. Vico (Sulmona-L'AQ) per rappresentare la scuola e partecipare al Premio "Alfieri del Lavoro" e alle prove di ammissione nel Collegio Universitario Lamaro Pozzani di Roma, realizzate dalla Federazione Nazionale dei Cavalieri del Lavoro
- 05/2001: Riconoscimento ed elezione alla carica di Consigliere nel Consiglio comunale dei bambini di Torre de' Passeri (PE)

Certificazioni

- Luglio 2016: CORSO DI FORMAZIONE GENERALE PER I LAVORATORI secondo il D.Lgs. 81/2008 e l'accordo Stato Regioni del 21/12/2011

autorizzo il trattamento dei miei dati personali ai sensi del Decreto Legislativo 30 giugno 2003, n. 196 "Codice in materia di

protezione
dei dati
personali".

Pescara, 10/11/2021

Elisabetta Natale

