

*Faculty, Adjunct professors, Research scientists,
Visiting scientists, Lecturers, PhD students, Post-doc
and Staff
at the Pescara Center
December 2015*

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ICRANet Faculty Staff

| | |
|-----------------------|---|
| Belinski, Vladimir | ICRANet |
| Bianco, Carlo Luciano | University of Rome “Sapienza” and ICRANet |
| Izzo, Luca | University of Rome “Sapienza” |
| Rueda, Jorge A. | University of Rome “Sapienza” and ICRANet |
| Ruffini, Remo | University of Rome “Sapienza” and ICRANet |
| Vereshchagin, Gregory | ICRANet |
| Xue, She-Sheng | ICRANet |

Adjunct Professors of the Faculty

| | |
|------------------------------|---|
| Aharonian, Felix Albert | <i>Benjamin Jegischewitsch Markarjan Chair</i> Dublin Institute for Advanced Studies, Dublin, Ireland Max-Planck-Institut für Kernphysik, Heidelberg, Germany |
| Amati, Lorenzo | Istituto di Astrofisica Spaziale e Fisica Cosmica, Italy |
| Arnett, David | <i>Subramanyan Chandrasekhar-ICRANet Chair</i> University of Arizona, Tucson, USA |
| Barres de Almeida, Ulisses | Centro Brasileiro Pesquisas Físicas, Brazil |
| Buchert, Thomas | University of Lyon, Saint-Genis-Laval, France |
| Chakrabarti, Sandip P. | Centre for Space Physics, India |
| Chardonnet, Pascal | Université de la Savoie, France |
| Chechetkin, Valeri | <i>Mstislav Vsevolodich Keldysh-ICRANet Chair</i> Keldysh institute for Applied Mathematics Moscow, Russia |
| Damour, Thibault | <i>Joseph-Louis Lagrange-ICRANet Chair</i> IHES, Bures sur Yvette, France |
| Della Valle, Massimo | Osservatorio di CapodiMonte, Italy |
| Einasto, Jaan | Tartu Observatory |
| Everitt, Francis | <i>William Fairbank-ICRANet Chair</i> Stanford University, USA |
| Fryer, Christopher Lee | Los Alamos National Lab, USA |
| Frontera, Filippo | University of Ferrara, Italy |
| Giavalisco, Mauro | Department of Astronomy, University of Massachusetts, USA |
| Jantzen, Robert | <i>Abraham Taub-ICRANet Chair</i> Villanova University USA |
| Jetzer, Philippe | Institute of Theoretical Physics, University of Zurich, Switzerland |
| Khalatnikov, Markovich Isaak | <i>Lev Davidovich Landau-ICRANet Chair</i> Landau Institute for Theoretical Physics, Russia |

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|-------------------------|--|
| Kleinert, Hagen | Richard Feynmann - ICRANet Chair, Freie Universität Berlin |
| Kerr, Roy | <i>Yevgeny Mikhajlovic Lifshitz-ICRANet Chair</i> University of Canterbury, New Zealand |
| Lee, Hyung Won | Inje University, Korea |
| Madey, John | <i>William Fairbank-ICRANet Chair</i> University of Hawaii |
| Mathews, Grant | University of Nôtre Dame, USA |
| Mirabel, Felix | CEA, France |
| Misner, Charles | <i>John Archibald Wheeler-ICRANet Chair</i> University of Maryland |
| Mo, Houjun | Department of Astronomy, University of Massachusetts, USA |
| Nicolai, Hermann | Albert Einstein Institute – Potsdam, Germany |
| Pelster, Axel | Institute for Advanced Study, Germany |
| Pian, Elena | INAF and Osservatorio Astronomico di Trieste |
| Piran, Tsvi | <i>Yuval Neeman-ICRANet Chair</i> The Hebrew University - Jerusalem |
| Popov, Vladimir | ITEP, Russia |
| Punsly, Brian Matthew | Mathew California University, Los Angeles USA |
| Quevedo ,Hernando | Institute of Nuclear Science, UNAM |
| Rosati, Piero | European Southern Observatory, Germany |
| 't Hooft, Gerard | <i>(Nobel Laureate)</i> Institut for Theoretical Physics Utrecht Universiteit, Holland |
| Titarchuk, Lev | US Naval Laboratory, USA |
| Zen Vasconcellos, Cesar | UFRGS, Brazil |

Lecturers

| | |
|----------------------------|--|
| Aksenov, Alexey | Institute for Theoretical and Experimental Physics |
| Alekseev, Georgy | Steklov Mathematical Institute-Russian Academy of Sciences |
| Bini, Donato | CNR and ICRANet, Italy |
| Chen, Pisin | National Taiwan University |
| Chieffi, Alessandro | INAF, Rome, Italy |
| Coulet, Pierre | Université de Nice - Sophia Antipolis, France |
| Di Castro, Carlo | Università di Roma "Sapienza", Italy |
| Filippi, Simonetta | ICRANet and Campus Biomedico, Italy |
| Jing, Yi-Peng | Shangai Astronomy Observatory |
| Lanz, Thierry | Observatoire de la Côte d'Azur, Nice, France |
| Lee, Chul Hoon | Hanyang University, Korea |
| Lee, Yung Kyu | Department of Physics, Hanyang University, Korea |
| Lou, You Qing | Tsinghua University, Beijing |
| Malheiro, Manuel | ITA, Brazil |
| 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 Roma |
| Sang, Pyo Kim | Kunsan National University, Korea |
| Sepulveda, Alonso | University of Antioquia, Colombia |
| Song, Doo Jong | National Institute of Astronomy, Korea |
| Starobinsky, Alexei | Landau Institute for Theoretical Physics, Russia |
| Sung-Won, Kim | Institute of Theoretical Physics for Asia-Pacific, Korea |
| Vissani, Francesco | Gran Sasso National Laboratories, Italy |
| Wiltshire, David | University of Canterbury, New Zealand |

Research Scientists

| | |
|--------------------------|--|
| Bernardini, Maria Grazia | ICRANet and Università di Roma “Sapienza”, Italy |
| Cherubini, Christian | Campus Biomedico, Rome, Italy |
| Geralico, Andrea | ICRANet and Università di Roma “Sapienza”, Italy |
| Lattanzi, Massimiliano | University of Oxford and ICRANet |
| Muccino, Marco | ICRANet and Università di Roma “Sapienza”, Italy |
| Rotondo, Michael | ICRANet and Università di Roma “Sapienza”, Italy |

Visiting Scientists

Abishev, Medeu

Ahmedov, Bobomurat

Ansoldi, Stefano

Arkhangelskaja, Irene

Batebi, Saghar

Bavarsad, Ehsan

Bernal, Cristian Giovanni

Blinne, Alexander

Cadez, Andrej

Carneiro Da Cunha, Bruno

Cho, Yongmin

Corvino, Giovanni

Davis, Stanley

De Lorenci, Vittorio

Fimin, Nicolaj

Gadri, Mohamed

Gell-Mann, Murray

Goulart, Erico

Haghighat, Mansour

Hoang, Ngoc Long

Hutsi, Gert

Kenesbek, Zhadyra

Kim, Hongsu

Kim, Hyeong-Chan

Kim, Hyuong Yee

Kim, Jin-Young

Lee, Chang-Hwan

Lee, Wonwoo
Malheiro, Manuel
Manchester, Dick
Manreza Paret, Daryel
Mansouri, Reza
Mohammadi, Rohollah
Motie, Iman
Nagataki, Shigehiro
Negreiros, Rodrigo
Nessipbay, Aizhan
Park, Il Heung
Park, Myeong-Gu
Passiltay, Ainur
Paudel, Rishiram
Peresano, Michele
Perez Martinez, Aurora
Piechocki, Wlodzimierz
Qadir, Asghar
Raffaelli, Bernard
Romero, Gustavo E.
Sasaki, Misao
Tarasenko, Alexander
Tkachenko, Alessya
Torres, Sergio
Tizchang, Seddigheh
Van Putten, Maurice
Yang, Jongmann
Yeom, Dong-han

Zalaletdinov, Roustam

Zhumabayeva, Symbat

International Relativistic Astrophysics Ph. D.

| | |
|---------------------------|-------------|
| <i>First Cycle</i> | 2002-05 |
| Peirani, Sebastien | France |
| <i>Second Cycle</i> | 2003-06 |
| Bernardini, Maria Grazia | Italy |
| Mattei, Alvise | Italy |
| Mercuri, Simone | Italy |
| <i>Third Cycle</i> | 2004-07 |
| Chiappinelli, Anna | France |
| Cianfrani, Francesco | Italy |
| Guida, Roberto | Italy |
| Rotondo, Michael | Italy |
| Yegoryan, Gegham | Armenia |
| <i>Fourth Cycle</i> | 2005-08 |
| Battisti, Marco Valerio | Italy |
| Dainotti, Maria.Giovanna | Italy |
| Khachatryan, Harutyun | Armenia |
| Lecian, Orchidea Maria | Italy |
| Pizzi, Marco | Italy |
| Pompi, Francesca | Italy |
| <i>Fifth Cycle</i> | 2006-09 |
| Caito, Letizia | Italy |
| De Barros, Gustavo | Brasil |
| Minazzoli, Olivier | Switzerland |
| Patricelli, Barbara | Italy |
| Rangel Lemos, Luis Juracy | Brazil |
| Rueda Hernandez, Jorge | Colombia |
| Armando | |
| <i>Sixth Cycle</i> | 2007-2010 |
| Ferroni, Valerio | Italy |
| Izzo, Luca | Italy |
| Kanaan, Chadia | Lebanon |
| Pugliese, Daniela | Italy |
| Sigismondi, Costantino | Italy |
| <i>Seventh Cycle</i> | 2008-2011 |
| Belvedere, Riccardo | Italy |
| Ceccobello, Chiara | Italy |
| Ferrara, Walter | Italy |
| Han, Wen-Biao | China |
| Luongo, Orlando | Italy |
| Pandolfi, Stefania | Italy |
| Taj, Safia | Pakistan |

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| <i>Eighth Cycle</i> | <i>2009-2012</i> |
| Boshkayev, Kuantay | Kazakhstan |
| Bravetti, Alessandro | Italy |
| Ejlli, Damian | Albania |
| Haney, Maria | Germany |
| Lombardi, Caterina Antonietta | Italy |
| Menegoni, Eloisa | Italy |
| Sahakyan, Narek | Armenia |
| Sahini, Sahil | India |

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| <i>Ninth Cycle</i> | <i>2010-2013</i> |
| Arguelles, Carlos | Argentina |
| Benetti, Micol | Italy |
| Muccino, Marco | Italy |

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| <i>Tenth Cycle</i> | <i>2011-2014</i> |
| Cáceres Uribe, Diego Leonardo | Colombia |
| Wang, Yu | China |

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| <i>Eleventh Cycle</i> | <i>2012-2015</i> |
| Barbarino, Cristina | Italy |
| Cipolletta, Federico | Italy |
| Dichiara, Simone | Italy |

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| <i>Twelfth Cycle</i> | <i>2013-2016</i> |
| Becerra, Laura | Colombia |
| Harutyunyan, Vahagn | Armenia |

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| <i>Thirteenth Cycle</i> | <i>2014-2017</i> |
| Moradi, Rahim | Iran |
| Rodriguez Ruiz, Jose Fernando | Colombia |

IRAP Ph. D. Erasmus Mundus Students

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

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| <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, Suwendu | India |
| Sversut Arsoli, Bruno | Brazil |
| Wu, Yuanbin | China |

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| <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 |

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| <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 |

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| <i>Fifth Cycle</i> | <i>2014-2017</i> |
| Aimuratov, Yerlan | Kazakhstan |
| Chang, Yu-Ling | Taiwan |
| Delgado, Camilo | Colombia |
| Efremov, Pavel | Russia |
| Karlica, Mile | Croatia |
| Krut, Andreas | Germany |
| Martinez Aviles, Gerardo | Mexico |

CAPES

First Cycle

2013-2018

PhD Students

Brandt, Carlos Henrique
Guimarães Carvalho, Gabriel
Lobo Pereira, Iarley

Senior Visitors to Brazil

Aharonian, Felix
Bisnovatyi Kogan, Gennady
Giommi, Paolo
Mathews, Grant
Rueda Hernández, Jorge Armando

Visitors to Europe/Asia

Rangel Lemos, Luis Juracy
Mosquera Cuesta, Herman J.
Picanço Negreiros, Rodrigo
Luchini Martins, Gabriel
Zen Vasconcellos, César Augusto

Postdoc in Europe and Asia

Bartosch Caminha, Gabriel
Goulart Coelho, Jaziel
Machado de Oliveira Fraga, Bernardo
Silva Bittencourt, Eduardo Henrique
Camargo Rodrigues de Lima, Rafael
Batista dos Santos, Grasielle

Postdoc in Brazil

Belvedere, Riccardo
Martins de Carvalho, Sheyse
Penacchioni, Ana Virginia
Siutsou, Ivan
Zaninoni, Elena

Administrative and Secretarial Staff

ICRANet - Pescara

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|------------------------|---|
| Adamo, Cristina | Administrative Office |
| Brandolini, Gabriele | System Manager |
| Cimini, Marzio Maria | Documentation Center (until April 2015) |
| Di Berardino, Federica | Head of the Secretarial Office |
| di Niccolo, Cinzia | Secretariat |
| Latorre, Silvia | Administrative Office |

ICRANet Br – Rio de Janeiro

Schaller, Flavia

ICRANet Faculty Staff

Belinski Vladimir



Position: ICRANet, Faculty Member

Period covered: December 2014 -December 2015

I Scientific Work

1. In 2014 ICRANet started the new program “Exact solutions in the super-symmetric General Relativity” in collaboration with the group of Prof. Hermann Nicolai at Albert Einstein Institute at Potsdam (Germany). This new direction is now in the list of the thematic of the ICRANet sector “Exact Solutions of the Einstein and Einstein-Maxwell equations”. The foremost target is construction of the exact solutions for super-gravitational solitons. During 2014-2015 the work have been dedicated to the extension of the generating technique known as the Inverse Scattering Method (ISM) to the super-gravity. Here we have two main problems: first to formulate the super-symmetric version of ISM for the two-dimensional integrable models in super-gravity and then to find a way to construct exact super-solitonic solutions. During this year both of these problems was solved for the 2-dimensional extended $N=2$ super-gravity and corresponding paper have been published in Physical Review D, reference [1].

2. A paper on the influence of the shear viscosity (in the framework of Israel-Stewart non-equilibrium thermodynamics) on the character of the cosmological singularity has been published, see reference [2]. The results confirm the previous author's statement on the existence of some types of viscous matter which are able to generate the stable Friedman-like initial cosmological singularity without any fine tuning.

3. The work on the book "Cosmological Singularity" (V.Belinski and M.Henneaux) has been continued. The project is in progress under the agreement with Cambridge University Press. This year was dedicated to the chapter "Oscillatory singularity in String models" and to few sections dedicated to the influence of different kinds of matter on the character of the singularity.

II Conferences and educational activities

Conferences:

- 1) 14th Marcel Grossmann Meeting, July 2015. I served as chairman of the "Quantum Fields" parallel session.
- 2) 14th Italian-Korean Meeting, July 2015, Rome. The talk: V. Belinski "Integrable Super-Gravity models".

2015 List of Publication

- [1] V. Belinski "Supergravitational Solitons", Phys. Rev. **D91**, 125041 (2015).
- [2] V. Belinski "The generic solution with isotropic Big Bang", Astronomy Reports (Springer), **59**, 425 (2015).

Bianco Carlo Luciano

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

Period covered: 2005 – 2015



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: Maria Grazia Bernardini, Letizia Caito, Maria Giovanna Dainotti, Gustavo De Barros, Maxime Enderli, Roberto Guida, Luca Izzo, Milos Kovacevic, Marco Muccino, Barbara Patricelli, Ana Virginia Penacchioni, Giovanni Battista Pisani, 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.

II e. Work With Postdocs

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

2015 List of Publication

A) REFEREED SCIENTIFIC JOURNALS

- A.1) R. RUFFINI, Y. WANG, M. ENDERLI, M. MUCCINO, M. KOVACEVIC, C.L. BIANCO, A.V. PENACCHIONI, G.B. PISANI, J.A. RUEDA; GRB 130427A and SN 2013cq: A Multi-wavelength Analysis of An Induced Gravitational Collapse Event; *The Astrophysical Journal*, **798**, 10 (2015).
<<http://adsabs.harvard.edu/abs/2015ApJ...798...10R>>
<<http://dx.doi.org/10.1088/0004-637X/798/1/10>>
- A.2) M. MUCCINO, R. RUFFINI, C.L. BIANCO, M. ENDERLI, M. KOVACEVIC, L. IZZO, A.V. PENACCHIONI, G.B. PISANI, J.A. RUEDA, Y. WANG; On binary driven hypernovae and their nested late X-ray emission; *Astronomy Reports*, **59**, 581 (2015).
<<http://adsabs.harvard.edu/abs/2015ARep...59..581M>>
<<http://dx.doi.org/10.1134/S1063772915070070>>
- A.3) R. RUFFINI, L. IZZO, C.L. BIANCO, J.A. RUEDA, C. BARBARINO, H. DERELI, M. ENDERLI, M. MUCCINO, A.V. PENACCHIONI, G.B. PISANI, Y. WANG; Induced gravitational collapse in the BATSE era: The case of GRB 970828; *Astronomy Reports*, **59**, 626 (2015).
<<http://adsabs.harvard.edu/abs/2015ARep...59..626R>>
<<http://dx.doi.org/10.1134/S1063772915070094>>
- A.4) Y. WANG, R. RUFFINI, M. KOVACEVIC, C.L. BIANCO, M. ENDERLI, M. MUCCINO, A.V. PENACCHIONI, G.B. PISANI, J.A. RUEDA; Predicting supernova associated to gamma-ray burst 130427a; *Astronomy Reports*, **59**, 667 (2015).
<<http://adsabs.harvard.edu/abs/2015ARep...59..667W>>
<<http://dx.doi.org/10.1134/S1063772915070148>>
- A.5) R. RUFFINI, M. MUCCINO, M. KOVACEVIC, F.G. OLIVEIRA, J.A. RUEDA, C.L. BIANCO, M. ENDERLI, A.V. PENACCHIONI, G.B. PISANI, Y. WANG, E. ZANINONI; GRB 140619B: a short GRB from a binary neutron star merger leading to black hole formation; *The Astrophysical Journal*, **808**, 190 (2015).
<<http://adsabs.harvard.edu/abs/2015ApJ...808..190R>>
<<http://dx.doi.org/10.1088/0004-637X/808/2/190>>
- A.6) R. RUFFINI, Y. AIMURATOV, C.L. BIANCO, M. ENDERLI, M. KOVACEVIC, R. MORADI, M. MUCCINO, A.V. PENACCHIONI, G.B. PISANI, J.A. RUEDA, Y. WANG; Induced gravitational collapse in FeCO Core-Neutron star binaries and Neutron star-Neutron star binary mergers; *International Journal of Modern Physics A*, **30**, 1545023 (2015).
<<http://adsabs.harvard.edu/abs/2015IJMPA..3045023R>>
<<http://dx.doi.org/10.1142/S0217751X15450232>>

B) CONFERENCE PROCEEDINGS

- B.1) M. MUCCINO, R. RUFFINI, C.L. BIANCO, L. IZZO, A.V. PENACCHIONI, G.B. PISANI; GRB 090227B: The missing link between the genuine short and long GRBs; in *Proceedings of the Thirteenth Marcel Grossmann Meeting on General Relativity*, Stockholm, Sweden, July 2012, R.T. Jantzen, K. Rosquist, R. Ruffini, Editors; World Scientific, (Singapore, 2015).
<<http://adsabs.harvard.edu/abs/2015mgm..conf.1757M>>
<http://dx.doi.org/10.1142/9789814623995_0275>
- B.2) A.V. PENACCHIONI, R. RUFFINI, C.L. BIANCO, L. IZZO, M. MUCCINO, G.B. PISANI, J.A. RUEDA; The family of the Induced Gravitational Collapse scenario: The case of GRB 110709B; in *Proceedings of the Thirteenth Marcel Grossmann Meeting on General Relativity*, Stockholm, Sweden, July 2012, R.T. Jantzen, K. Rosquist, R. Ruffini, Editors; World Scientific, (Singapore, 2015).
<<http://adsabs.harvard.edu/abs/2015mgm..conf.1768P>>
<http://dx.doi.org/10.1142/9789814623995_0278>
- B.3) A.V. PENACCHIONI, R. RUFFINI, C.L. BIANCO, L. IZZO, M. MUCCINO, G.B. PISANI; GRB 111228, analysis within the Induced Gravitational Collapse scenario and association with a supernova; in *Proceedings of the Thirteenth Marcel Grossmann Meeting on General Relativity*, Stockholm, Sweden, July 2012, R.T. Jantzen, K. Rosquist, R. Ruffini, Editors; World Scientific, (Singapore, 2015).
<<http://adsabs.harvard.edu/abs/2015mgm..conf.1781P>>
<http://dx.doi.org/10.1142/9789814623995_0281>
- B.4) G.B. PISANI, L. IZZO, R. RUFFINI, C.L. BIANCO, M. MUCCINO, A.V. PENACCHIONI, J.A. RUEDA, Y. WANG; On a novel distance indicator for Gamma-Ray Bursts associated with supernovae; in *Proceedings of the Thirteenth Marcel Grossmann Meeting on General Relativity*, Stockholm, Sweden, July 2012, R.T. Jantzen, K. Rosquist, R. Ruffini, Editors; World Scientific, (Singapore, 2015).
<<http://adsabs.harvard.edu/abs/2015mgm..conf.1789P>>
<http://dx.doi.org/10.1142/9789814623995_0283>
- B.5) M. MUCCINO, R. RUFFINI, C.L. BIANCO, L. IZZO, A.V. PENACCHIONI, G.B. PISANI; GRB 090510, explosion of a GRB in the highest circumburst medium even inferred: a disguised short GRB; in *Proceedings of the Thirteenth Marcel Grossmann Meeting on General Relativity*, Stockholm, Sweden, July 2012, R.T. Jantzen, K. Rosquist, R. Ruffini, Editors; World Scientific, (Singapore, 2015).
<<http://adsabs.harvard.edu/abs/2015mgm..conf.1813M>>
<http://dx.doi.org/10.1142/9789814623995_0286>
- B.6) L. IZZO, G.B. PISANI, M. MUCCINO, R. RUFFINI, C.L. BIANCO, M. ENDERLI, Y. WANG; Hints for a physically based GRB distance indicator; in *Proceedings of the Thirteenth Marcel Grossmann Meeting on General Relativity*, Stockholm, Sweden, July 2012, R.T. Jantzen, K. Rosquist, R. Ruffini, Editors; World Scientific, (Singapore, 2015).
<<http://adsabs.harvard.edu/abs/2015mgm..conf.2102I>>
<http://dx.doi.org/10.1142/9789814623995_0368>

Izzo Luca

Position: Junior Staff
Period covered: 2013 - 2016



I Scientific Work

- Data reduction and Analysis of Gamma-Ray bursts observed by Swift and Fermi
- Support for the Swift-XRT team (one week per month on-duty for the monitor of GRBs observed by Swift)
- Analysis of nova phenomena in outbursts
- Cosmology with GRBs

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Swift – 10 years of discovery - Rome, 2-5 December 2014
- 2nd Cesar-Lattes meeting – Rio de Janeiro, 11-19 April 2015
- XIV Marcel Grossmann on General Relativity – Rome, 12-18 July 2015
- The Golden Age of Cataclysmic Variables and Related Objects III – Palermo, 7-12 September 2015
- IX Congresso Nazionale Oggetti Compatti – Rome, 22-25 September 2015

II b Work With Students

- 1) Induced gravitational collapse in the BATSE era: The case of GRB 970828, Astronomy Reports (2015) – students: Cristina Barbarino, Maxime Enderli, Yu Wang
- 2) On binary driven hypernovae and their nested late X-ray emission, Astronomy Reports (2015) - students: Cristina Barbarino, Maxime Enderli, Yu Wang, Milos Kovacevic

II c Diploma thesis supervision

II d Other Teaching Duties

Main lecturer and organizer of the "1st ICRANet Lecture Series for PhD students", University of Rome Sapienza, Italy.

II e. Work With Postdocs

- 1) New measurements of Ω_m with gamma-ray bursts, A&A (2015) – postdocs: Marco Muccino and Elena Zaninoni
- 2) Induced gravitational collapse in the BATSE era: The case of GRB 970828, Astronomy Reports (2015) – postdocs: Marco Muccino, Giovanni Battista Pisani, Carlo Luciano Bianco, Jorge Rueda

3) On binary driven hypernovae and their nested late X-ray emission, Astronomy Reports (2015) - postdocs: Marco Muccino, Giovanni Battista Pisani, Carlo Luciano Bianco, Jorge Rueda

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

Main lecturer and organizer of the "1st ICRANet Lecture Series for PhD students", University of Rome Sapienza, Italy.

III b. Outside ICRANet

Support for the Swift-XRT team (one week per month on-duty for the monitor of GRBs observed by Swift)

IV. Other

Seminar held at

- Pontificia Università Católica de Chile, Santiago – January 2015

- Instituto Superior Tecnico, Lisbona – November 2015

- Osservatorio Astronomico di Capodimonte – November 2015

2015 List of Publication

Refereed

-L. Izzo; M. Muccino; E. Zaninoni; L. Amati; M. Della Valle; “New measurements of Ω_m from gamma-ray bursts”, A&A accepted for publication, (2015), Astron & Astroph., 582, 115, (2015), arXiv:1508.05898

-L. Izzo; M. Della Valle; E. Mason; F. Matteucci; D. Romano; L. Pasquini; L. Vanzì; A. Jordan; J. M. Fernandez; P. Bluhm; R. Brahm; N. Espinoza; R. Williams; “Early Optical Spectra of Nova V1369 Cen Show the Presence of Lithium”, Astroph. Journal Letters, 808, 14, (2015), arXiv:1506.08048

-J. M. Diego; T. Broadhurst; N. Benitez; K. Umetsu; D. Coe; I. Sendra; M. Sereno; L. Izzo; G. Covone; “A free-form lensing grid solution for A1689 with new multiple images”, MNRAS, 446, 683, (2015), arXiv:1402.4170

-S. Cao; G. Covone; E. Jullo; J. Richard; L. Izzo, Luca; Z. H. Zhu; “Source-plane Reconstruction of the Giant Gravitational Arc in A2667: A Candidate Wolf-Rayet Galaxy at $z \sim 1$ ”, Astron. Journal, 149, 3, (2015), arXiv:1410.6594

-L. Amati; et al.; “Probing the emission physics and weak/soft population of Gamma-Ray Bursts with LOFT”, White Paper in Support of the Mission Concept of the Large Observatory for X-ray Timing, arXiv:1501.02771, (2015)

-R. Ruffini; L. Izzo; C.L. Bianco; J.A. Rueda; C. Barbarino; H. Dereli; M. Enderli; M. Muccino; A.V. Penacchioni; G.B. Pisani; Y. Wang; “Induced gravitational collapse in the BATSE era: The case of GRB 970828”, Astronomy Rep., 59, 626, (2015)

-M. Muccino; R. Ruffini; C.L. Bianco; M. Enderli; M. Kovacevic; L. Izzo; A.V. Penacchioni; G.B. Pisani; J.A. Rueda; Y. Wang; “On binary driven hypernovae and their nested late X-ray emission”, *Astronomy Rep.*, 59, 581, (2015).

Rueda Hernández Jorge Armando

Position:

Faculty Professor at ICRANet

Member of ICRANet Faculty

IRAP PhD Faculty

Period covered: 2011-Present



Coordinator of the CAPES-ICRANet Program at ICRANet

CAPES-ICRANet Program Visiting Professor in Brazil

Period covered: 2013-2016

I Scientific Work

1) Nuclear and Atomic Astrophysics.

Within this subject of research I study the properties and processes occurring in compact stars in which nuclear and atomic physics have to be necessarily applied. I focus on the properties of nuclear matter under extreme conditions of density and pressure found in these objects. The equation of state of matter in compact stars is studied in detail taking into account all the interactions between the constituents within a full relativistic framework.

2) White Dwarfs Physics and Astrophysics.

I analyze the structure of white dwarfs within a self-consistent description of the equation of state of the interior together with the solution of the hydrostatic equilibrium equations in general relativity. Both not-magnetized and magnetized white dwarfs are studied. I am also interested in the astrophysics of white dwarfs both isolated and in binaries systems. Magnetized white dwarfs, soft gamma repeaters, anomalous X-ray pulsars, white dwarf pulsars, cataclysmic variables, binary white dwarf mergers, and type Ia supernovae are studied. The role of a realistic white dwarf interior structure is particularly emphasized.

3) Neutron Stars Physics and Astrophysics.

I am interested in computing the properties of the interior structure of neutron stars using realistic models of the nuclear matter equation of state within the general relativistic equations of equilibrium. Strong, weak, electromagnetic and gravitational interactions have to be jointly taken into due account within a self-consistent fully relativistic framework. Both unmagnetized and magnetized neutron stars are considered. From the astrophysical viewpoint, I study systems harboring neutron stars such as isolated and binary pulsars, low and intermediate X-ray binaries, inspiraling and merging double neutron stars. Most extreme cataclysmic events involving neutron stars and their role in the explanation of extraordinarily energetic astrophysical events such as gamma-ray bursts are analyzed in detail.

4) Radiation Mechanisms of White Dwarfs and Neutron Stars.

I study the possible emission mechanisms of white dwarfs and neutron stars. I consider both electromagnetic and gravitational radiation at work in astrophysical systems such as compact star

magnetospheres, in-spiraling and merging relativistic double neutron stars, neutron star-white dwarfs, and neutron star-black hole binaries.

5) Exact Solutions of the Einstein and Einstein-Maxwell Equations in Astrophysics.

I am also interested in studying the ability of analytic exact solutions of the Einstein and Einstein-Maxwell equations to describe the exterior spacetime of compact stars such as white dwarfs and neutron stars. The problem of matching between interior and exterior spacetimes is addressed in detail. The effect of the quadrupole moment on the properties of the spacetime is also investigated. Particular attention is given to the application of exact solutions in astrophysics, e.g. the dynamics of particles around compact stars and its relevance in astrophysical systems such as X-ray binaries.

6) Critical Fields and Non-linear Electrodynamics Effects in Astrophysics.

I study the conditions under which ultrastrong electromagnetic fields can develop in astrophysical systems such as neutron stars and in the process of gravitational collapse to a black hole. The effects of non-linear electrodynamics minimally coupled to gravity are investigated. New analytic and numeric solutions to the Einstein-Maxwell equations representing black holes or the exterior field of a compact star are obtained and analyzed. The consequences on extreme astrophysical systems, for instance gamma-ray bursts, are studied.

7) Distribution of Dark Matter in Galaxies and Cosmological Implications

I study the possible distribution of equilibrium of dark matter particles in galaxies. Particular attention is given to the distribution of fermion candidates. I analyze the possible mass as well as self-interactions that such fermions could have in order to be in agreement with the current astrophysical and cosmological observational constraints. The dark matter distribution in dwarf spheroidal, elliptic, spiral, and big spiral galaxies is considered. I am at the same time interested in the consequences that the inferred dark matter properties and distribution have in cosmology.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Organizer of the “First Sandoval Vallarta Caribbean Meeting”, Mexico City, Mexico, November 30-December 3, 2015. <www.icranet.org/1sv/>

Organizer of the First Julio Garavito Armero Meeting on Relativistic Astrophysics”, Bucaramanga and Bogotá, Colombia, 23-27 November, 2015. <www.icranet.org/1jg/>

II b Work With Students

Below in the section II c, I list the PhD theses which I have supervised and the ones currently under supervision. They are all distributed in the seven topics listed above in the section I. I also include the scientific production which has been the result of these PhD researches.

II c Diploma thesis supervision

In the following list of PhD theses developed under my supervision, I have also included the topics, from the list of section I, in which the PhD students have performed or are performing their research.

- PhD thesis of Jose Fernando Rodriguez Ruiz 2014-2017, Sapienza University of Rome, Italy. Topics: 1-4. Fellowship: IRAP-PhD

Scientific Production:

L. Becerra, E. Garcia-Berro, J. F. Rodriguez, J. A. Rueda, “Observables of young, massive, magnetized white dwarfs produced by white dwarf mergers”, in preparation.

- PhD thesis of Laura Becerra Bayona 2013-2016, Sapienza University of Rome, Italy. Topics: 1-4. Fellowship: IRAP-PhD

Scientific Production:

L. Becerra, F. Cipolletta, C. L. Fryer, J. A. Rueda, and R. Ruffini, “Angular Momentum Role in the Hypercritical Accretion of Binary-driven Hypernovae”, *ApJ*, vol. 812, p. 100, Oct. 2015.

- PhD thesis of Luis Gabriel Gómez 2013-2016, Sapienza University of Rome, Italy and University of Nice Sophia-Antipolis, Nice, France. Topics: 7. Fellowship: Erasmus Mundus IRAP-PhD

Scientific Production:

L. Gabriel-Gomez and J. A. Rueda, “The Role of the Dark Matter Distribution in the Structure Formation”, *Proc. Second César Lattes Meeting*, in press.

- PhD thesis of Fernanda Gomes Oliveira 2012-2015, Sapienza University of Rome, Italy and University of Nice Sophia-Antipolis, Nice, France. Topics: 2-4. Fellowship: Erasmus Mundus IRAP-PhD

Scientific Production:

C. L. Fryer, F. G. Oliveira, J. A. Rueda, and R. Ruffini, “On the Neutron Star-Black Hole Binaries Produced by Binary-driven-hypernovae”, *Phys. Rev. Lett.*, in press.

R. Ruffini, M. Muccino, M. Kovacevic, F. G. Oliveira, J. A. Rueda, C. L. Bianco, M. Enderli, A. V. Penacchioni, G. B. Pisani, Y. Wang, and E. Zaninoni, “GRB 140619B: a short GRB from a binary neutron star merger leading to black hole formation”, *ApJ*, vol. 808, p. 190, Aug. 2015.

F. G. Oliveira, J. A. Rueda, and R. Ruffini, “X, Gamma-Rays, and Gravitational Waves Emission in a Short Gamma-Ray Burst” *Astrophysics and Space Science Proceedings*, vol. 40, p. 43, 2015.

F. G. Oliveira, J. A. Rueda, and R. Ruffini, “Gravitational Waves versus X-Ray and Gamma-Ray Emission in a Short Gamma-Ray Burst”, *ApJ*, vol. 787, p. 150, June 2014.

- PhD thesis of Diego Leonardo Cáceres Uribe 2011-2014, Sapienza University of Rome, Italy. Topics: 2 and 4. Fellowship: IRAP-PhD

Scientific Production:

Jaziel G. Coelho, R. C. R. de Lima, D. L. Cáceres, M. Malheiro, J. A. Rueda, R. Ruffini “On the Rotation-power Nature of SGRs and AXPs”, ApJ, submitted.

J. G. Coelho, R. M. Marinho, M. Malheiro, R. Negreiros, D. L. Cáceres, J. A. Rueda, and R. Ruffini, “Dynamical Instability of White Dwarfs and Breaking of Spherical Symmetry Under the Presence of Extreme Magnetic Fields”, ApJ, vol. 794, p. 86, Oct. 2014.

D. L. Cáceres, J. A. Rueda, and R. Ruffini, “On the stability of ultra-magnetized white dwarfs”, Journal of Korean Physical Society, vol. 65, pp. 846{849, Sept. 2014.

- PhD thesis of Jonas Pedro Pereira's PhD 2011-2014, Sapienza University of Rome, Italy and University of Nice Sophia-Antipolis, Nice, France. Topics: 3 and 6. Fellowship: Erasmus Mundus IRAP-PhD

Scientific Production:

J. P. Pereira and J. A. Rueda, “Energy decomposition within Einstein-Born-Infeld black holes”, Phys. Rev. D, vol. 91, p. 064048, Mar. 2015.

J. P. Pereira and J. A. Rueda, “Radial Stability in Strati_ed Stars”, ApJ, vol. 801, p. 19, Mar. 2015.

J. P. Pereira, J. G. Coelho, and J. A. Rueda, “Stability of thin-shell interfaces inside compact stars”, Phys. Rev. D, vol. 90, p. 123011, Dec. 2014.

J. P. Pereira, H. J. Mosquera Cuesta, J. A. Rueda, and R. Ruffini, “On the black hole mass decomposition in nonlinear electrodynamics”, Physics Letters B, vol. 734, pp. 396{402, June 2014.

- PhD thesis of Carlos Raul Arguelles 2011-2014, Sapienza University of Rome, Italy. Topics: 7. Fellowship: IRAP-PhD

Scientific Production:

C. R. Arguelles, J. A. Rueda, and R. Ruffini, “Theoretical evidence of 50 keV fermionic dark matter from Milky Way observables”, Phys. Rev. Lett., submitted.

C. R. Arguelles, N. E. Mavromatos, J. A. Rueda, and R. Ruffini, “The role of self-interacting right-handed neutrinos in galactic structure”, JCAP, submitted.

R. Ruffini, C. R. Arguelles, and J. A. Rueda, “On the core-halo distribution of dark matter in galaxies”, MNRAS, vol. 451, pp. 622-628, July 2015.

R. Ruffini, C. R. Arguelles, B. M. O. Fraga, A. Geralico, H. Quevedo, J. A. Rueda, and I. Siutsou, “Black Holes in Gamma Ray Bursts and Galactic Nuclei”, International Journal of Modern Physics D, vol. 22, p. 60008, Sept. 2013.

- PhD thesis of Sheyse Martins de Carvalho 2010-2013, Sapienza University of Rome, Italy and University of Nice Sophia-Antipolis, Nice, France. Topics: 1-3. Fellowship: Erasmus Mundus IRAP-PhD

Scientific Production:

S. M. de Carvalho, J. A. Rueda, and R. Ruffini, “On the Relativistic Feynman-Metropolis Equation of State at Finite Temperatures”, Proc. Thirteenth Marcel Grossmann Meeting, pp. 2481-2483, Jan. 2015.

S. M. de Carvalho, R. Negreiros, J. A. Rueda, and R. Ruffini, “Thermal evolution of neutron stars with global and local neutrality”, Phys. Rev. C, vol. 90, p. 055804, Nov. 2014.

S. M. de Carvalho, J. A. Rueda, and R. Ruffini, “On the cooling of globally-neutral neutron stars”, Journal of Korean Physical Society, vol. 65, pp. 861-864, Sept. 2014.

S. M. de Carvalho, M. Rotondo, J. A. Rueda, and R. Ruffini, “Relativistic Feynman-Metropolis-Teller treatment at finite temperatures”, Phys. Rev. C, vol. 89, p. 015801, Jan. 2014.

S. M. de Carvalho, J. A. Rueda, M. Rotondo, C. Argüelles, and R. Ruffini, “The Relativistic Feynman Metropolis Teller Theory at Zero and Finite Temperatures”, International Journal of Modern Physics Conference Series, vol. 23, pp. 244-247, Jan. 2013.

- PhD thesis of Riccardo Belvedere 2008-2013, Sapienza University of Rome, Italy. Topics: 1, 3-4. Fellowship: IRAP-PhD

Scientific Production:

R. Belvedere, J. A. Rueda, and R. Ruffini, “On the Magnetic Field of Pulsars with Realistic Neutron Star Configurations”, ApJ, vol. 799, p. 23, Jan. 2015.

R. Belvedere, J. A. Rueda, and R. Ruffini, “Static and rotating neutron stars fulfilling all fundamental interactions”, Journal of Korean Physical Society, vol. 65, pp. 897-902, Sept. 2014.

R. Belvedere, K. Boshkayev, J. A. Rueda, and R. Ruffini, “Uniformly rotating neutron stars in the global and local charge neutrality cases”, Nuclear Physics A, vol. 921, pp. 33-59, Jan. 2014.

R. Belvedere, J. A. Rueda, and R. Ruffini, “Neutron Star Cores in the General Relativistic Thomas-Fermi Treatment”, International Journal of Modern Physics Conference Series, vol. 23, pp. 185-192, Jan. 2013.

R. Belvedere, D. Pugliese, J. A. Rueda, R. Ruffini, and S.-S. Xue, “Neutron star equilibrium configurations within a fully relativistic theory with strong, weak, electromagnetic, and gravitational interactions”, Nuclear Physics A, vol. 883, pp. 1-24, June 2012.

R. Belvedere, J. Rueda, and R. Ruffini, “Mass, Radius and Moment of Inertia of Neutron Stars”, Proc. X-ray Astrophysics up to 511 keV, p. 7, Sept. 2011.

R. Belvedere, J. A. Rueda, R. Ruffini, and S.-S. Xue, “The influence of the core on the structure of the outer crust of neutron stars”, Proc. 25th Texas Symposium on Relativistic Astrophysics, p. 270, 2010.

**- PhD thesis of Kuantay Boshkayev 2009-2012, Sapienza University of Rome, Italy. Topics: 2-5.
Fellowship: IRAP-PhD**

K. Boshkayev, J. Rueda, and M. Muccino, “Extracting multipole moments of neutron stars from quasi-periodic oscillations in low mass X-ray binaries”, *Astronomy Reports*, vol. 59, pp. 441-446, June 2015.

K. Boshkayev, J. A. Rueda, R. Ruffini, and I. Siutsou, “General Relativistic and Newtonian White Dwarfs”, *Proc. Thirteenth Marcel Grossmann Meeting*, pp. 2468-2474, Jan. 2015.

K. Boshkayev, J. A. Rueda, and R. Ruffini, “SGRs and AXPs as Massive Fast Rotating Highly Magnetized White Dwarfs: the case of SGR 0418+5729”, *Proc. Thirteenth Marcel Grossmann Meeting*, pp. 2295-2300, Jan. 2015.

K. Boshkayev, D. Bini, J. Rueda, A. Geralico, M. Muccino, and I. Siutsou, “What can we extract from quasiperiodic oscillations?”, *Gravitation and Cosmology*, vol. 20, pp. 233-239, Oct. 2014.

K. Boshkayev, J. A. Rueda, R. Ruffini, and I. Siutsou, “General relativistic white dwarfs and their astrophysical implications”, *Journal of Korean Physical Society*, vol. 65, pp. 855-860, Sept. 2014.

R. Belvedere, K. Boshkayev, J. A. Rueda, and R. Ruffini, “Uniformly rotating neutron stars in the global and local charge neutrality cases”, *Nuclear Physics A*, vol. 921, pp. 33-59, Jan. 2014.

J. A. Rueda, K. Boshkayev, L. Izzo, R. Ruffini, P. Loren-Aguilar, B. Kulebi, G. Aznar-Siguán, and E. Garcia-Berro, “A White Dwarf Merger as Progenitor of the Anomalous X-Ray Pulsar 4U 0142+61?”, *ApJL*, vol. 772, p. L24, Aug. 2013.

K. Boshkayev, L. Izzo, J. A. Rueda, and R. Ruffini, “SGR 0418+5729, Swift J1822.3-1606, and 1E 2259+586 as massive, fast-rotating, highly magnetized white dwarfs”, *A&A*, vol. 555, p. A151, July 2013.

K. Boshkayev, J. Rueda, and R. Ruffini, “On the Maximum Mass and Minimum Rotation Period of Relativistic Uniformly Rotating White Dwarfs”, *International Journal of Modern Physics Conference Series*, vol. 23, pp. 193-197, Jan. 2013.

K. Boshkayev, J. A. Rueda, R. Ruffini, and I. Siutsou, “On General Relativistic Uniformly Rotating White Dwarfs”, *ApJ*, vol. 762, p. 117, Jan. 2013.

K. Boshkayev, J. Rueda, and R. Ruffini, “On the Maximum Mass of General Relativistic Uniformly Rotating White Dwarfs”, *International Journal of Modern Physics E*, vol. 20, pp. 136-140, 2011.

II d Other Teaching Duties

In addition to the supervision of PhD theses, I teach in the IRAP PhD Program and in the Doctoral Schools organized within it. The topics of teaching are the ones in section I.

II e International Scientific Collaborations

In Brazil: with Prof. Sergio B. Duarte from CBPF at Rio de Janeiro, Prof. R. Negreiros from UFF at Niterói, Prof. Débora P. Menezes from UFSC at Florianópolis Profs. S. O. Kepler and C. A. Z. Vasconcellos from UFRGS at Porto Alegre, Profs. R. Marinho Jr and M. Malheiro from ITA at São José dos Campos, Prof. Luis J. Rangel-Lemos from UFT at Palma.

In Colombia: with Profs. Luis Nuñez and Guillermo González from UIS at Bucaramanga, Prof. Leonardo A. Pachón from UdeA at Medellín, Prof. César A. Valenzuela from Univalle at Cali.

In Kazakhstan: with Prof. Kuantay Boshkayev from Al-Farabi Kazakh National University at Almaty.

In Mexico: with Prof. Hernando Quevedo from UNAM at México D. F.

In Spain: with Prof. Enrique García-Berro from UPC at Barcelona.

In USA: with Prof. Chris L. Fryer from LANL at New Mexico, Prof. G. Mathews from UND at South Bend.

II e. Work With Postdocs

-Riccardo Belvedere (CAPES-ICRANet Program Fellow at ICRANet - Rio de Janeiro and Universidade Federal Fluminense). Scientific collaboration in the topics 1 and 3.

Scientific Production:

R. Belvedere, J. A. Rueda, and R. Ruffini, “On the Magnetic Field of Pulsars with Realistic Neutron Star Configurations”, *ApJ*, vol. 799, p. 23, Jan. 2015.

R. Belvedere, K. Boshkayev, J. A. Rueda, and R. Ruffini, “Uniformly rotating neutron stars in the global and local charge neutrality cases”, *Nuclear Physics A*, vol. 921, pp. 33-59, Jan. 2014.

- Rafael Camargo Rodrigues de Lima (CAPES-ICRANet Program Fellow at ICRANet - Pescara). Scientific collaboration in the topics 1 and 3.

Scientific Production:

Jaziel G. Coelho, R. C. R. de Lima, D. L. Caceres, M. Malheiro, J. A. Rueda, R. Ruffini “On the Rotation-power Nature of SGRs and AXPs”, *ApJ*, submitted.

- Sheyse Martins de Carvalho (CAPES-ICRANet Program Fellow at ICRANet – Rio de Janeiro and Universidade Federal Fluminense). Scientific collaboration in the topics 1-3.

Scientific Production:

S. M. de Carvalho, R. Negreiros, J. A. Rueda, and R. Ruffini, “Thermal evolution of neutron stars with global and local neutrality”, *Phys. Rev. C*, vol. 90, p. 055804, Nov. 2014.

- Jaziel Goulart Coelho (CAPES-ICRANet Program Fellow at ICRANet and Sapienza University of Rome). Scientific collaboration in the topics 1-3.

Scientific Production:

Jaziel G. Coelho, R. C. R. de Lima, D. L. Caceres, M. Malheiro, J. A. Rueda, R. Ruffini “On the Rotation-power Nature of SGRs and AXPs”, *ApJ*, submitted.

J. G. Coelho, R. M. Marinho, M. Malheiro, R. Negreiros, D. L. Caceres, J. A. Rueda, and R. Ruffini, “Dynamical Instability of White Dwarfs and Breaking of Spherical Symmetry Under the Presence of Extreme Magnetic Fields”, *ApJ*, vol. 794, p. 86, Oct. 2014.

J. P. Pereira, J. G. Coelho, and J. A. Rueda, “Stability of thin-shell interfaces inside compact stars”, *Phys. Rev. D*, vol. 90, p. 123011, Dec. 2014.

Ruffini Remo

Position: Director ICRANet



Curriculum Vitae:

- Doctorate in Physics, University of Rome, 1966.
- Postdoctoral fellow Mainz Academy of Sciences. Hamburg, Fed. Republic, Germany, 1967.
- Postdoctoral fellow Palmer Physics Lab. Princeton University, N.J., 1967-68.
- Member Institute for Advanced Study, Princeton, N.J., 1968-70.
- Instructor, Princeton Univ., 1970-71.
- Assistant Professor, Princeton University, 1971-74.
- Member Institute for Advanced Study, Princeton, N.J. 1974-76 .
- Visiting professor Kyoto University (Japan), 1975.
- Visiting professor University of Western Australia, Nedlands (Australia), 1975.
- Professor University of Catania, Italy, 1976-78.
- Professor, Chair of Theoretical Physics, University of Rome “la Sapienza”, 1978-2012
- Member Council of Center. International Physics, Bogotá, Colombia, 1984-
- President International Center Relativistic Astrophysics (ICRA), 1985-
- Director of ICRANet, 2005-present
- Member of Task Force Scientific Use of Space Station NASA, Washington, 1986-88.
- Chairman International Organizing Committee of Marcel Grossmann Meetings, 1984-
- Member International Forum on the Scientific Use of Space Station, Washington, 1986-90.
- Member of Consiglio Ricerche Astronomiche, Rome, 1987-91.
- Co-Chairman Italian-Korean Meetings on Relativistic Astrophysics, Rome and Seoul, 1987-
- Chairman William Fairbanks Meetings, 1990-
- President of the Scientific Committee of the Italian Space Agency, Rome, 1989-93.
- Member of the Board of ENEA, 2004-
- Co-Director Advanced Series in Astrophysics and Cosmology-World Scientific, Singapore, 1986
- Editor Internat. Jour. Modern Phys. D World Scientific Singapore, 1992-

- Editor of the series “The Marcel Grossmann meetings on relativistic Field Theories”, 1985-
- Co- Editor of the Series” Italo-Korean meetings on Relativistic Astrophysics”.
- Member Sigma Xi.
- Member Italian Physical Society.
- Founding Member of European Physical Society.
- Member of Euroscience
- Fellow recipient:
 - Cressy Morrison award of the New York Academy of Sciences , 1972.
 - Fellow of the American Physical Society 1974-
 - Alfred P. Sloan Foundation fellow, 1974-76.
 - Space Scientist of the Year Award, 1992.
 - Honorary Professor of University of Kirghizia 1998-

Main Scientific Publications:

Coauthor, among others, of the following books:

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 Diri 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

2015 List of Publication

1. Mesquita, A., Razeira, M., Ruffini, R., Rueda, J. A., Hadjimichef, D., Gomes, R. O., & Vasconcellos, C. A. Zen; An effective field theory for neutron stars with many-body forces, strong Σ -repulsion, and K- and K0 condensation; *Astronomische Nachrichten*, 336,
2. Ruffini, R., Aimuratov, Y., Bianco, C. L., Enderli, M., Kovacevic, M., Moradi, R., Muccino, M., Penacchioni, A. V., Pisani, G. B., Rueda, J. A., & Wang, Y.; Induced gravitational collapse in FeCO Core-Neutron star binaries and Neutron star-Neutron star binary mergers; *International Journal of Modern Physics A*, 30,
3. Cai, Rong-Gen, Ruffini, Remo, & Wu, Yue-Liang; Preface; *International Journal of Modern Physics A*, 30,
4. Becerra, L., Cipolletta, F., Fryer, Chris L., Rueda, Jorge A., & Ruffini, Remo; Angular Momentum Role in the Hypercritical Accretion of Binary-driven Hypernovae; *The Astrophysical Journal*, 812,
5. Ludwig, H., Ruffini, R., & Xue, S.-S.; Collective electronic pulsation around giant nuclei in the Thomas-Fermi model; *Nuclear Physics A*, 941, 15
6. Ruffini, R., Muccino, M., Kovacevic, M., Oliveira, F. G., Rueda, J. A., Bianco, C. L., Enderli, M., Penacchioni, A. V., Pisani, G. B., Wang, Y., & Zaninoni, E.; GRB 140619B: a short GRB from a binary neutron star merger leading to black hole formation; *The Astrophysical Journal*, 808
7. Cipolletta, F., Cherubini, C., Filippi, S., Rueda, J. A., & Ruffini, R.; Fast rotating neutron stars with realistic nuclear matter equation of state; *Physical Review D*, 92
8. Ruffini, R., Argüelles, C. R., & Rueda, J. A.; On the core-halo distribution of dark matter in galaxies; *Monthly Notices of the Royal Astronomical Society*, 451, 628
9. Wang, Y., Ruffini, R., Kovacevic, M., Bianco, C. L., Enderli, M., Muccino, M., Penacchioni, A. V., Pisani, G. B., & Rueda, J. A.; Predicting supernova associated to gamma-ray burst 130427a; *Astronomy Reports*, 59, 671
10. Siutsou, I., Argüelles, C. R., & Ruffini, R.; Dark matter massive fermions and Einasto profiles in galactic haloes; *Astronomy Reports*, 59, 666
11. Ruffini, R., Izzo, L., Bianco, C. L., Rueda, J. A., Barbarino, C., Dereli, H., Enderli, M., Muccino, M., Penacchioni, A. V., Pisani, G. B., & Wang, Y.; Induced gravitational collapse in the BATSE era: The case of GRB 970828; *Astronomy Reports*, 59, 638
12. Ruffini, Remo; Black holes, supernovae and gamma ray bursts; *Astronomy Reports*, 59, 625
13. Muccino, Marco, Ruffini, Remo, Bianco, Carlo Luciano, Enderli, Maxime, Kovacevic, Milos, Izzo, Luca, Penacchioni, Ana Virginia, Pisani, Giovanni Battista, Rueda, Jorge A., & Wang, Yu; On binary driven hypernovae and their nested late X-ray emission; *Astronomy Reports*, 59, 590

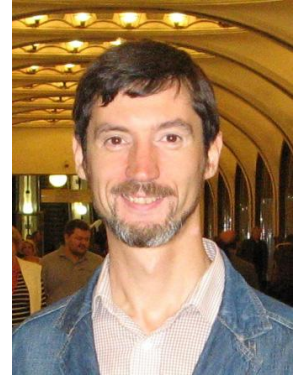
14. Chen, Pisin & Ruffini, R.; Did gamma ray burst induce Cambrian explosion?; *Astronomy Reports*, 59, 473
15. Aksenov, A. G., Ruffini, R., & Vereshchagin, G. V.; Radiative transfer in relativistic plasma outflows and comptonization of photons near the photosphere; *Astronomy Reports*, 59, 424
16. Kilin, S. Ya., Ruffini, R., & Vereshchagin, G.; An international conference in honour of the centennial of the birth of Ya.B. Zeldovich, "Subatomic Particles, Nucleons, Atoms, the Universe: Processes and Structure"; *Astronomy Reports*, 59, 417
17. Mathews, Grant & Ruffini, Remo; Constraints on the Source for Gamma-ray bursts from Observed X-Ray Afterglows; *APS April Meeting Abstracts*
18. de Carvalho, Sheyse M., Rueda, Jorge A., & Ruffini, Remo; On the Relativistic Feynman-Metropolis Equation of State at Finite Temperatures; *Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories*, 2483
19. Boshkayev, K., Rueda, J. A., Ruffini, R., & Siutsou, I.; General Relativistic and Newtonian White Dwarfs; *Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories*, 2474
20. Boshkayev, K., Rueda, J. A., & Ruffini, R.; Sgrs and Axps as Massive Fast Rotating Highly Magnetized White Dwarfs: the Case of SGR 0418+5729; *Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories*, 2300
21. Izzo, L., Pisani, G. B., Muccino, M., Ruffini, R., Bianco, C. L., Enderli, M., & Wang, Y.; Hints for a Physically Based GRB Distance Indicator; *Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories*, 2105
22. Muccino, M., Ruffini, R., Bianco, C. L., Izzo, L., Penacchioni, A. V., & Pisani, G. B.; GRB 090510, Explosion of a GRB in the Highest Circumburst Medium Ever Inferred: a Disguised Short GRB; *Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories*, 1816
23. Pisani, G. B., Izzo, L., Ruffini, R., Bianco, C. L., Muccino, M., Penacchioni, A. V., Rueda, J. A., & Wang, Y.; On a Novel Distance Indicator for Gamma-Ray Bursts Associated with Supernovae; *Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories*, 1793
24. Penacchioni, A. V., Ruffini, R., Bianco, C. L., Izzo, L., Muccino, M., & Pisani, G. B.; GRB 111228, Analysis Within the Induced Gravitational Collapse Scenario and Association with a Supernova; *Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories*, 1785
25. Penacchioni, A. V., Ruffini, R., Bianco, C. L., Izzo, L., Muccino, M., Pisani, G. B., & Rueda, J. A.; The Family of the Induced Gravitational Collapse Scenario: the Case of GRB 110709B;

- Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 1772
26. Muccino, M., Ruffini, R., Bianco, C. L., Izzo, L., Penacchioni, A. V., & Pisani, G. B.; GRB 090227B: the Missing Link Between the Genuine Short and Long GRBS; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 1759
 27. Aksenov, A. G., Ruffini, R., & Vereshchagin, G. V.; Radiative Transfer Near the Photosphere of Mildly and Ultrarelativistic Outflows; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 1756
 28. Ruffini, R., Siutsou, I. A., & Vereshchagin, G. V.; Photon Thick and Photon Thin Relativistic Outflows and GRBS; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 1750
 29. Argüelles, Carlos & Ruffini, Remo; a Regular and Relativistic Einstein Cluster Within the s2 Orbit Centered in SgrA*; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 1740
 30. Fraga, Bernardo M. O., Argüelles, Carlos, Ruffini, Remo, & Siutsou, Ivan; Semidegenerate Self-Gravitating System of Fermion as Dark Matter on Galaxies i: Universality Laws; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 1733
 31. Amati, Lorenzo, Campana, Riccardo, Evangelista, Yuri, Feroci, Marco, Fuschino, Fabio, Labanti, Claudio, Salvaterra, Ruben, Stratta, Giulia, Tagliaferri, Gianpiero, Frontera, Filippo, Guidorzi, Cristiano, Rosati, Piero, Titarchuk, Lev, Braga, João Penacchioni, Ana, Ruffini, Remo, Izzo, Luca, Zampa, Nicola, Vacchi, Andrea, Santangelo, Andrea, Hudec, Rene, Gomboc, Andreja, & Rodic, Tomaz; Game: GRB and All-Sky Monitor Experiment; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 901
 32. Ruffini, Remo; From Tian Shan to the Tian Kong: Personal Reflections on Fang Lizhi; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 455
 33. Ruffini, Remo; Black Holes, Supernovae and Gamma Ray Bursts; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 314
 34. Rueda, Jorge A. & Ruffini, Remo; Strong, Weak, Electromagnetic, and Gravitational Interactions in Neutron Stars; Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, 209

35. Belvedere, R., Rueda, Jorge A., & Ruffini, R.; On the Magnetic Field of Pulsars with Realistic Neutron Star Configurations; *The Astrophysical Journal*, 799,
36. Ruffini, R., Wang, Y., Enderli, M., Muccino, M., Kovacevic, M., Bianco, C. L., Penacchioni, A. V., Pisani, G. B., & Rueda, J. A.; GRB 130427A and SN 2013cq: A Multi-wavelength Analysis of An Induced Gravitational Collapse Event; *The Astrophysical Journal*, 798,
37. Ruffini, R., Bianco, C. L., Enderli, M., Kovacevic, M., Muccino, M., Pisani, G. B., Rueda, J. A., & Wang, Y.; GRB 150513A: request for X-ray follow up.; *GRB Coordinates Network*, 17871,
38. Oliveira, F. G., Rueda, Jorge A., & Ruffini, R.; X, Gamma-Rays, and Gravitational Waves Emission in a Short Gamma-Ray Burst; *Astrophysics and Space Science Proceedings*, 40,

Vereshchagin Gregory

Position: researcher
Period covered: 2015



I Scientific Work

The work focused on the following aspects:

- Bose enhancement and Pauli blocking in the pair plasma (with I.A. Siutsou, A.G. Aksenov and R. Ruffini)

Interactions in homogeneous electron-positron-photon plasma are studied numerically using the relativistic kinetic Boltzmann equation, with collision integrals including Bose enhancement and Pauli blocking corrections. The new method of computing collision integrals is developed.

- Thermal emission in the early afterglow of GRBs from their interaction with supernova ejecta (with R. Ruffini and Yu Wang)

The interaction between the GRB ejecta and a baryonic shell is considered in the context of the binary driven hypernova model of Gamma-Ray Bursts. The kinematic and observational properties of the shell after the interaction are derived. In particular, the temperature and the duration of the thermal emission are obtained. The model is then applied to GRB 090618 and the observed characteristics of the thermal component are reproduced.

- Cosmic absorption of ultra high energy particles (with R. Ruffini and S.-S. Xue)

This work summarizes the limits on propagation of ultra high energy particles in the Universe, set up by their interactions with cosmic background of photons and neutrinos. By taking into account cosmic evolution of these backgrounds and considering appropriate interactions we derive the mean free path for ultra high energy photons, protons and neutrinos. For photons the relevant processes are the Breit-Wheeler process as well as the double pair production process. For protons the relevant reactions are the photopion production and the Bethe-Heitler process. We discuss the interplay between the energy

loss length and mean free path for the Bethe-Heitler process. Neutrino opacity is determined by its scattering off the cosmic background neutrino. We compute for the first time the high energy neutrino horizon as a function of its energy.

- Interaction of high energy photons with the background radiation in the Universe (with S. Tizchang, S. Batebi, R. Mohammadi, S.-S. Xue and R. Ruffini)

We study high energy cosmic ray in interaction with cosmic microwave background (CMB). We calculate optical depth due to Euler-Heisenberg photon-photon scattering at cosmological redshift. According to our result for CMB background and comparing with constrain obtained from Breit-Wheeler pair production, Euler-Heisenberg at energy less than TeV impose almost the same constrain as Breit-Wheeler on transparency of high energy cosmic photons. We also discuss implications of our results for two astrophysical data, Gamma Ray Burst and Blazar. We confirm theoretical bound in observation of high energy photons.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

- S. Tizchang, S. Batebi: on interaction of high energy photons with the background radiation in the Universe

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

- Ivan Siutsou: on Bose enhancement and Pauli blocking in the pair plasma
- Wang Yu: on thermal emission in early afterglow from the GRB-SNR interaction

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
- coordinating cooperation with the Belarusian State University
- coordinating cooperation with the National Academy of Sciences of Belarus

- co-chair (with J. Michael Burgess) of the parallel session GB4 “Photospheric Emission in GRBs” at the Fourteenth Marcel Grossmann Meeting (MG14).
- organizational work for MG14, as a member of the LOC
- organizational work for the 14th Italian-Korean Symposium on Relativistic Astrophysics, as a member of the organizing committee
- organizational work for the First Sandoval Vallarta Meeting on Relativistic Astrophysics
- editorial work as co-editor of the proceedings of the Zeldovich-100 Meeting
- editorial work as co-editor of the proceedings of the Second ICRANet César Lattes Meeting

III b. Outside ICRANet

IV. Other

2015 List of Publication

1. G.V. Vereshchagin, "Relativistic Kinetic Theory with some Applications", in: *Cosmology and Gravitation: XVth Brazilian School of Cosmology and Gravitation*, eds. Mario Novello and Santiago E. Perez Bergliaffa, Cambridge Scientific Publishers, 2015, pp 1-40.
2. A. G. Aksenov, R. Ruffini, and G. V. Vereshchagin, “Radiative transfer in relativistic plasma outflows and comptonization of photons near the photosphere”, *Astronomy Reports*, Vol. 59, No. 6, (2015) pp. 418–424.
3. G. V. Vereshchagin, “Physics of Non-Dissipative Ultrarelativistic Photospheres”, in *Proceedings of the MG13 Meeting on General Relativity*, eds. Rosquist et al., WSPC (2015) pp. 708-728.
4. R. Ruffini, I.A. Siutsou and G.V. Vereshchagin, “Photon Thick and Photon Thin Relativistic Outflows and GRBs”, in *Proceedings of the MG13 Meeting on General Relativity*, eds. Rosquist et al., WSPC (2015) pp. 1748-1750.
5. A.G. Aksenov, R. Ruffini and G.V. Vereshchagin, “Radiative Transfer Near the Photosphere of Mildly and Ultrarelativistic Outflows”, in *Proceedings of the MG13 Meeting on General Relativity*, eds. Rosquist et al., WSPC (2015) pp. 1754-1756.
6. D. Bégué, I.A. Siutsou and G.V. Vereshchagin, “On the Decoupling of Photons from Relativistically Expanding Outflows”, in *Proceedings of the MG13 Meeting on General Relativity*, eds. Rosquist et al., WSPC (2015) pp. 1760-1761.
7. R. Ruffini, G. V. Vereshchagin and S.-S. Xue, “Cosmic absorption of ultra high energy particles”, submitted to *Astrophys. Space Sci.* (2015).

8. R. Ruffini G. V. Vereshchagin Yu Wang, “Thermal emission in the early afterglow of GRBs from their interaction with supernova ejecta”, submitted to *A&A* (2015).
9. I. A. Siutsou, A. G. Aksenov and G. V. Vereshchagin, “On Thermalization of Electron-Positron-Photon Plasma”, to appear in proceedings of the Second César Lattes Meeting, *AIP Conf. Proc.* (2015).
10. S. Tizchang, S. Batebi, G.V. Vereshchagin, R. Mohammadi, S.-S. Xue and R. Ruffini, “Interaction of high energy photons with the background radiation in the Universe”, in preparation (2015).

Xue She-Sheng

Position: ICRANet Faculty

Period covered: 2014-2015



I Scientific Work

Strong and pulsating electromagnetic field in gravitational collapse and heavy atoms, as well as its relevance to Gamma-Ray Bursts (GRBs) and heavy atom 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 organization of ICRANet meetings in Korea and China: the 14th Italian-Korean meeting (July, 2015, Pescara, Korea) and 4th Galileo –Xu Guangqi meeting (GX4, May 1st, 2015) and their proceedings.

Participating organization of MG14 Rome, July 2015, and acting as a chair of the parallel section.

The first Scientific ICRANet Meeting in Armenia, 30 June - 4 July 2014 – Yerevan (Armenia)
IZEST-ELI-NP Meeting (Extreme Light's New Horizons Introducing Zepto and Zettawatt Science Societal Applications), Sept.~ 17-19, 2014, Paris, France.

II b Work With Students

Wang Yu, Li Liang , XiaoFeng Yang, and Iranian students, Rahim Moradi, Seddigheh Tizchang and Saghar Batebi

II c Diploma thesis supervision

Yuanbin Wu, Handrik Ludwig, Eckhard Strobel, and Clement Stahl.

II d Other Teaching Duties

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

II e. Work With Postdocs

Ivan, Siutsou, Carlos Argulles, Christine Gruber, Rohoollah Mohammadi, and Ehsan Bavarsad.

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.

Participating preparation of ICRANet Newsletter and ICRANet news for Hyperspce news.

III b. Outside ICRANet

IV. Other

2015 List of Publication

L. Hendrik, R. Ruffini, and S.-S. Xue, "Collective electronic pulsation of compressed atoms in Thomas-Fermi model", Nuclear Physics A 941 (2015) 1–15.

E. Strobel and S.-S. Xue, "Semiclassical pair production rate for rotating electric fields", Phys. Rev. D 91, 045016 2015.

S.-S. Xue, "How universe evolves with cosmological and gravitational constants in the field theory of Einstein–Cartan gravity", Nuclear Physics B897 (2015) 326–345.

H. Kleinert and S.-S. Xue, "Critical fermion density for restoring spontaneously broken symmetry", Mod. Phys. Lett. A, Vol. 30, No. 24 (2015) 1550122

S.-S. Xue, "Resonant and nonresonant phenomena of four-fermion operators in Einstein-Cartan theory " Physics Letters B 744 (2015) 88–94

J. Rueda, R. Ruffini, Y.-B. Wu and S.-S. Xue, "Surface tension for heavy atoms", submitted to Phys. Rev. C.

R. Ruffini, G. Vereshchagin and S.-S. Xue, "Cosmic absorption of ultra high energy particles" to appear in Astrophysics and Space Science.

Adjunct Professors of the Faculty

Aharonian Felix

Position:

Adjunct Professor of the ICRANet Faculty

Member of the ICRANet Scientific Committee

Professor, Dublin Institute for Advanced Studies,
Dublin, Ireland (2006-presently)

Head of the High Energy Astrophysics Theory
Group, Max-Planck-Institute for Nuclear Physics,
Heidelberg, Germany (1992-presently)



I Scientific Work

Fields of Research: High Energy Astrophysics, Cosmic Rays, X-ray Astronomy,
Gamma Ray Astronomy, Neutrino Astronomy, Theoretical Astrophysics

Areas of Interest: Radiation Processes, Particle Acceleration Processes, Interstellar Medium,
Relativistic Outflows (Pulsar Winds and AGN Jets), Cosmology

Involvement in major Projects:

Member (representative of ESA) of the Science Working Group of the
JAXA-NASA-ESA X-ray mission ASTRO-H

Member of the H.E.S.S. Collaboration Board

Member of the KM3NeT Consortium Board

Publications: more than 500 papers published in peer-reviewed journals, > 25,000 citations, h-index
87

II Conferences and educational activities

II a Conferences and Other External Scientific Work

in 2015 was a SOC (Scientific Organizing Committee)
member of six International Conferences and Workshop

II b Work With Students

Supervision of 7 PhD students - 4 in MPIK/Heidelberg,
1 DIAS/Dublin, 1 GSSI/L'Aquila, 1 ICRANet/Yerevan

II c Diploma thesis supervision

II d Other Teaching Duties

A regular course on High Energy Astrophysics (20 hours) for students
of the Gran Sasso Science Institute (GSSI), L'Aquila, Italy

II e. Work With Postdocs

Currently I supervise 9 PostDocs in MPIK/Heidelberg and DIAS/Dublin

III. Service activities

III a. Within ICRANet

Member of the Scientific Committee of ICRANet
Supervision of two PhD students in the Armenian Seat of ICRANet
Lecture on Synchrotron Radiation for the students belongs to ICRANet
Consultations to students and ICRANet staff members on different scientific topics

III b. Outside ICRANet

Member of the Scientific Advisory Committee of Astroparticle Physics European Consortium (APPEC)
Chair of the Intern. Advisory Council of the Institute of Sciences of Cosmos, University of Barcelona

IV. Other

Editor of the International Journal of Modern Physics D

2014 List of Publication

In addition to 27 papers of the HESS, KM3Net and ASTRO-H collaboration, I am a co-author of the following papers published since 2014 in peer reviewed journals:

N. Furukawa, A. Ohama, T. Fukuda, K. Torii, T. Hayakawa, H. Sano, T. Okuda, H. Yamamoto, N. Moribe,
A. Mizuno, H. Maezawa, T. Onishi, A. Kawamura, N. Mizuno, J.R. Dawson, T.M. Dame, Y. Yonekura, F.
Aharonian, E.D. Wilhelmi, G.P. Rowell, R. Matsumoto, Y. Asahina, Y. Fukui, "The Jet and Arc
molecular
clouds towards Westerlund 2, RCW, RCW 49, and HESS J1023-575; (CO)-C-12 AND (CO)-C-13
(J=2-1

- and $J=1-0$) observations with NANTEN and MOPRA telescopes”, *Astrophysical Journal*, 781 (2014).
- S. Gabici, F.A. Aharonian, “Hadronic gamma-rays from RX J1713.7-3946?”, *Monthly Notices of the Royal Astronomical Society*, 445 (2014).
- E. Kafexhiu, F. Aharonian, A.M. Taylor, G.S. Vila, “Parametrization of gamma-ray production cross sections for pp interactions in a broad proton energy range from the kinematic threshold to PeV energies”, *Physical Review D*, 90 (2014).
- S.R. Kelner, E. Lefa, F.M. Rieger, F.A. Aharonian, “The beaming pattern of external Compton emission from relativistic outflows: The case of anisotropic distribution of electrons”, *Astrophysical Journal*, 785 (2014).
- S.R. Kelner, A.Y. Prosekin, F.A. Aharonian, “Synchro-curvature radiation of charged particles in the strong curved magnetic fields”, *Astronomical Journal*, 149 (2015).
- D. Khangulyan, F.A. Aharonian, S.R. Kelner, “Simple analytical approximation for treatment of inverse Compton scattering of relativistic electrons in the blackbody radiation field”, *Astrophysical Journal*, 783 (2014).
- R.Y. Liu, X.Y. Wang, S. Inoue, R. Crocker, F. Aharonian, “Diffuse PeV neutrinos from EeV cosmic ray sources: Semirelativistic hypernova remnants in star-forming galaxies”, *Physical Review D*, 89 (2014).
- R.Z. Yang, E.D. Wilhelmi, F. Aharonian, “Probing cosmic rays in nearby giant molecular clouds with the Fermi Large Area Telescope”, *Astronomy & Astrophysics*, 566 (2014).
- V.N. Zirakashvili, F.A. Aharonian, R. Yang, E. Ona-Wilhelmi, R.J. Tuffs, “Nonthermal radiation if young supernova remnants: the case of Cas A”, *Astrophysical Journal*, 785 (2014).
- A.M. Taylor, S. Gabici, F. Aharonian, “Galactic halo origin of the neutrinos detected by IceCube”, *Physical Review D*, 89 (2014).
- R.Z. Yang, F. Aharonian, R. Crocker, “The Fermi bubbles revisited”, *Astronomy & Astrophysics*, 567 (2014).
- R.Z. Yang, D.I. Jones, F. Aharonian, “Fermi-LAT observations of the Sagittarius B complex”, *Astronomy & Astrophysics*, 580 (2015).
- A.Y. Prosekin, S.R. Kelner, F.A. Aharonian, “Transition of propagation of relativistic particles from the ballistic to the diffusion regime”, *Physical Review D*, 92 (2015).

Amati Lorenzo



Position: Adjunct Professor of the ICRANet Faculty and staff researcher at INAF (IASF Bologna).

Period covered: full 2015

Short CV

Lorenzo Amati was born in Modena, Italy, in 1966. He graduated in Astronomy at the University of Bologna in 1991 and received the PhD degree in astronomy from University "La Sapienza" of Rome in 1999. Since 1998, Lorenzo Amati is a research staff member at the Institute of Space Astrophysics and Cosmic Physics (IASF) in Bologna, which is part of the Italian National Institute for Astrophysics (INAF). He is also Adjunct Professor of the Faculty of the International Center for Relativistic Astrophysics Network (ICRANet) and member of the Faculty of the PhD course in Physics at the University of Ferrara. In 2011 Lorenzo Amati was elected member of the Board for Relativistic and Particle Astrophysics of the Italian National Institute for Astrophysics (INAF). Lorenzo Amati has also been Member of the Space Astrophysics Working Group of the Italian Space Agency (ASI) in 2007-2008, has been member of the BeppoSAX team from 1996 to 2002, is member of the Swift team since 2005, is member of the ATHENA collaboration since 2014, is member of the LOFT consortium and coordinator of the THESEUS consortium, is member of the International Astronomical Union (IAU), of SIGRAV and of ISGRG (International Society on General Relativity and Gravitation).

I Scientific Work

My field of research is high energy astrophysics, with particular emphasis on Gamma-Ray Bursts (GRB) studies. Under this respect, his research highlights include the discovery (in 2000) of a transient X-ray absorption edge in the first 13 s of GRB 990705, leading to the first estimate for a GRB redshift based on X-ray data, and the discovery of a strong correlation between the photon energy at which GRB spectra peaks and their radiated energy (known as "Amati relation"), which has relevant implication for the physics and possible cosmological use of these phenomena. Lorenzo Amati is also involved in the

study (science case and instrument concept) of future missions for GRB studies (e.g., THESEUS) and dedicates a minor part of his research work to the study of X-ray binaries.

My scientific collaboration with ICRANet is focused on Gamma-Ray Burst (GRB) astrophysics, with particular emphasis on the testing of the fireshell model against X-ray and gamma-ray data of the prompt emission. In particular, in 2015 we concentrated on the use of correlations between observables of the prompt and afterglow emission of GRBs for standardizing GRBs (e.g., the “combo relation”, Izzo et al. 2015, A&A 582, A115), on the further investigations of the links between long and short GRBs and SNe, following our work Kovacevic et al., 2014, 569, A108) and on the observational evidences supporting either the isotropic or collimated emission scenarios (e.g., Izzo, Della Valle & Amati, 2015, IAU Symposium, Volume 313, pp. 392-393). Finally, ICRANet was involved in the preparation of the proposal for ESA/M5 of THESEUS, a mission concept aiming at exploiting GRBs for the investigation of the Early Universe.

Besides my collaboration with ICRANet, my main scientific activity includes: spectral, timing and correlation properties of GRBs, investigation of the cosmological use of GRBs, X-ray spectral and timing properties of X-ray binaries, study of the scientific case and concept design of GRB detectors for future missions. Under this last respect, in particular, in 2015 I coordinated, as Lead Proposer, the preparation of the proposal THESEUS (Transient High-Energy Sky and Early Universe Explorer), submitted to ESA in response to the Call for next M5 mission. I also continued coordinating the GRB Science Working Group of the LOFT mission collaboration.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

December 2015: 28th Texas Symposium on Relativistic Astrophysics, Geneva, Switzerland (oral presentation)

December 2015: Cosmology and First Light, Parigi, France (oral presentation)

September 2015: IX Italian National Workshop on Compact Objects (CNOC IX)
Monte Porzio Catone - Rome, Italy (oral presentation)

September 2015: Astrophysical Probes of Fundamental Physics
Ferrara, Italy (lecturer)

July 2015: Fourteenth Marcel Grossmann Meeting - MG14
Roma, Italy (invited oral presentation)

April 2015: ISSI-BJ Workshop on Gamma-Ray Bursts: a tool to explore the young Universe
Beijing, China (invited oral presentation)

II b Work With Students

In 2015 I mostly worked with Disha Sawant, student of the IRAP Erasmus Mundus PhD at University of Ferrara, concerning the investigation of the E_p, i – intensity correlations in GRBs. I also worked with

Onelda Bardho, student of the IRAP Phd Erasmus Mundus PhD at University of Nice on the statistical analysis and classification of GRB X-ray afterglow light curves and on the multi-wavelength analysis and interpretation of GRB141221A.

II c Diploma thesis supervision

I am the supervisor of Disha Sawant, student of the IRAP Erasmus Mundus PhD at University of Ferrara, who will defend her Thesis on next February 29th.

II d Other Teaching Duties

II e. Work With Postdocs

In 2015 I mostly worked with Dr. Luca Izzo, Dr. Marco Muccino and N. Pisani on the use of the correlations between prompt and afterglow GRB observables for cosmology and on the association of GRBs (long and short) with SNe.

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

In 2015 I was part of the Local Organizing Committee of the Fourteenth Marcel Grossmann Meeting - MG14 held in Roma, Italy. I am the supervisor of the PhD of Disha Sawant, student of the IRAP Erasmus Mundus PhD.

III b. Outside ICRANet

I am member of the Faculty of the PhD in Physics and Geophysical Sciences at University of Ferrara. In September 2015 I have been Lecturer at the PhD school "Astrophysical Probes of Fundamental Physics" at University of Ferrara, Italy. Until Dec. 2015 I have been member of the Board for Relativistic and Particle Astrophysics of INAF (Macroarea 4). I acted as referee for some of the main Refereed Journals in the field of astrophysics (ApJ, MNRAS, A&A). I acted as a reviewer for the Italian ministry of Education and University (MIUR, SIR projects).

2015 List of Publication

E. Zaninoni, M.G. Bernardini, R. Margutti, **L. Amati**, 2015, " Update on the GRB universal scaling $E_{\text{iso}}-E_{\text{gamma}}-E_{\text{pk}}$ with ten years of Swift data. ", Monthly Notices of the Royal Astronomical Society, 455, 1375 (will be published in 2016)

L. Izzo, M. Muccino, E. Zaninoni, **L. Amati**, M. Della Valle, 2015, " A new measurement of Ω_M from Gamma-Ray Bursts ", Astronomy & Astrophysics, 582, A115

G. Ghirlanda, R. Salvaterra, G. Ghisellini, S. Mereghetti, G. Tagliaferri, S. Campana, J. P. Osborne, P. O'Brien, N. Tanvir, D. Willingale, **L. Amati**, S. Basa, M.G. Bernardini, D. Burlon, S. Covino, P. D'Avanzo, F. Frontera, D. Gotz, A. Melandri, L. Nava, L. Piro, S. D. Vergani, 2015, " Accessing the

population of high redshift Gamma Ray Bursts " , Monthly Notices of the Royal Astronomical Society, 448, 2514

C. Guidorzi, S. Dichiara, F. Frontera, R. Margutti, A. Baldeschi, **L. Amati**, 2015, " A common stochastic process rules gamma-ray burst prompt emission and X-ray flares " , The Astrophysical Journal, 801, 57

L. Amati, S. Capozziello, A.C. Ruggeri, M. De Laurentis, M. Della Valle, O. Luongo, G. Stratta, 2015, " The SKA contribution to GRB cosmology " , Proceedings of Advancing Astrophysics with the Square Kilometre Array (AASKA14), Proceedings Of Science, conf.215, id.56

L. Izzo, M. Della Valle, **L. Amati**, 2015, Proceedings of the International Astronomical Union, IAU Symposium, Volume 313, pp. 392-393

L. Amati, R. Campana, Y. Evangelista, et al., 2015, Proceedings of the MG13 Meeting on General Relativity, 889-901

L. Amati, M. Della Valle, 2015, Proceedings of the MG13 Meeting on General Relativity, 769-780

L. Amati , G. Strata, Atteia, J.-L., et al., White Paper in Support of the Mission Concept of the Large Observatory for X-ray Timing, eprint arXiv:1501.02772

Arnett William David



Present position: Adjunct Professor of the ICRANet Faculty
Regents Professor, Steward Observatory, University of Arizona, Tucson AZ, 85721

Education:
University of Kentucky, B.S., 1961;
Yale University, M.S. 1963, Ph.D. 1965, Physics

Previous position:
B. and E. Sunny Distinguished Service Professor, Astrophysics, Physics, and Enrico
Fermi Institute, University of Chicago, 1976-88

Professional Societies:
American Astronomical Society;
American Physical Society (Fellow)
International Astronomical Union
American Association for the Advancement of Science (Fellow).

Fellowships and Awards:
Alfred P. Sloan Research Fellowship, 1970
Yale Distinguished Graduate in Physical Sciences (with J. W. Truran), 1980
A. von Humboldt Prize (Senior Scientist), 1981
Member, National Academy of Sciences (1985-)
Member, American Academy of Arts and Sciences (1985-)
Member, Aspen Center for Physics (1997-2007)
Honorary Professor, Jilin University, Changchun, PRC (2005)
S. Chandrasekhar Lecture, Bose Center for Physics, Kolkata, (2007)
S. Chandrasekhar Professor, ICRANet, Rome, Pescara, Nice (2007-)
Bethe Prize, American Physical Society, 2009
Marcel Grossman Prize, International Center for Relativistic Astrophysics, 2012
Henry Norris Russell Lecturer, American Astronomical Society, 2012

Faculty Fellow, Texas A&M University Institute for Advanced Study, 2015-2016

Recent Professional Activities:

National Research Council Committee, "Potential Impact of High-End Computing", 2008
National Research Council Committee, "Future Directions for NSF Advanced Computing
Infrastructure to Support U. S. Science in 2017-2020"
Department of Energy Joint Needs Panel, "High Energy Density Laboratory Plasmas", 2009
National Ignition Campaign Review Committee, Lawrence Livermore National Laboratory,
2009-2013
Board, International Center for Relativistic Astrophysics Network, 2009-

Publications:

Book: Supernovae and Nucleosynthesis, Princeton University Press, 1996, 598 pages, 443
citations.
Articles: over 400 (over 200 in refereed journals), h-index = 64, over 13,000 citations, as of
2015

Buchert Thomas



Position: Professor of Cosmology
Staff Member of CRAL, Head of GALPAC :
Université Lyon 1 and École Normale Supérieure Lyon
Adjunct Professor of the Faculty : ICRANet
Period covered: January 2015 - December 2015

I Scientific Work

Investigation of (Lagrangian) perturbative models in relativistic cosmology including gravitoelectric perturbation and solution schemes at any order, and gravitational waves at first order. Observational strategies to detect an inhomogeneous metric in the Baryonic Acoustic Oscillation peak. Rebuttal paper on the Green-Wald formalism, co-authored by 10 relativists, demonstrating the inapplicability of the Green-Wald theorems to backreaction of inhomogeneities on average properties of the Universe.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- LOC and ICC of MG14 - 07/2015 :
organizer of parallel session DE2 on "Inhomogeneous Cosmology"
(co-chaired with Alan Coley and David Wiltshire)
organizer of parallel session DE3 on "Large-scale structure and Statistics"
(co-chaired with Hagen Kleinert)
- SOC - 08 / 2015 : 1st "Roman Juszkiewicz Symposium", Warsaw, Poland

II b Work With Students

3 PhD students: Fosca Al Roumi (thesis defence in September 2015), and two students (ongoing) in collaboration with the University of Torun, Poland (Jan J. Ostronski, T. Kazimierzczak).

II c Diploma thesis supervision: 1 Master student (Pierre Mourier, 2015), who works now with me for one year on an extended internship that started in September 2015, before he begins his thesis In Lyon.

II d Other Teaching Duties see below.

II e. Work With Postdocs : Collaboration with Alexander Wiegand (CfA Harvard, U.S.A.).

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 : none

III b. Outside ICRANet : Two Master Courses on "Cosmology and Gravitational Systems" and "Introduction to Theories of Gravitation" (École Normale Supérieure, Lyon) ; Exercises in "Continuum Mechanics" and "Mathematical Methods". Doctoral Course at the University of Santiago, Chile (April 2015).

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

2015 List of Publications

peer-reviewed:

Roukema B.F., Buchert T., Ostrowski J.J., France M.J.: ‘Evidence for an environment-dependent shift in the baryon acoustic oscillation peak’. M.N.R.A.S. 448, 1660-1673 (2015).

Alles A., Buchert T., Al Roumi F., Wiegand A.: ‘Lagrangian theory of structure formation in relativistic cosmology III: gravitoelectric perturbation and solution schemes at any order’. Phys. Rev. D 92, 023512 (2015).

Buchert T., Carfora M., Ellis G.F.R., Kolb E.W., MacCallum M.A.H., Ostrowski J.J., Räsänen S., Roukema B.F., Andersson L., Coley A.A., Wiltshire D.L.: ‘Is there proof that backreaction of inhomogeneities is irrelevant in cosmology?’ Class. Quant. Grav. 32, 215021 (2015).

Roukema B.F., Buchert T., Fujii H., and Ostrowski J.J.: ‘Is the baryon acoustic oscillation peak a cosmological standard ruler?’ M.N.R.A.S. Letters, in press (2015).

invited papers:

Buchert T., Coley A.A., Kleinert H., Roukema B.F., Wiltshire D.L.: ‘Observational Challenges for the Standard FLRW Model’. in Proceedings of the Fourteenth Marcel Grossmann Meeting on General Relativity, Rome 2015, M. Bianchi, R.T. Jantzen, R. Ruffini (eds.), Singapore: World Scientific, to be submitted (2015) - Report on DE3 Parallel Session.

Ostrowski J.J., Buchert T., Roukema B.F.: ‘The relativistic mass function on galaxy cluster scales’. in Proceedings of the Fourteenth Marcel Grossmann Meeting on General Relativity, Rome 2015, M. Bianchi, R.T. Jantzen, R. Ruffini (eds.), Singapore: World Scientific, to be submitted (2015).

Al Roumi F., Buchert T.: ‘Gravitoelectric relativistic perturbation and solution schemes and gravitoelectromagnetism’. in Proceedings of the Fourteenth Marcel Grossmann Meeting on General Relativity, Rome 2015, M. Bianchi, R.T. Jantzen, R. Ruffini (eds.), Singapore: World Scientific, to be submitted (2015).

Chakrabarti Sandip Kumar

Position: Adjunct Professor, ICRANET
Senior Professor and Head, Astrophysics and Cosmology
S.N. Bose National Centre for Basic Sciences
and
In Charge, Indian Centre for Space Physics

Period covered: 2015



I Scientific Work

We have completed several numerical simulations of black hole accretion to show that Two Component Advective Flow (TCAF) solution of black hole accretion is valid and implemented the solution into NASA/XSPEC software. We fitted data of several black hole candidates to obtain physical parameters such as accretion rates, shock locations, etc. which are not done by any other model. We have studied the attenuation of ionospheric signals to show that antarctic ice mass extent could be measured from the attenuation of very low frequency radio signal. I led the balloon borne astronomy and earth science team to have a total of 20 balloon missions (D69 to D89) in which several good quality data was obtained and various payloads (including a Phoswich detector of 5" diameter) have been tested. In astrobiology/astrochemistry work we have studied abundances of DNA constituents such as adenine, cytosine etc. and their precursors in the star forming regions so that we may observe where such biomolecules could be observed. We studied the formation of deuterated isotopomers.

II Conferences and educational activities

II a Conferences and Other External Scientific Work:

January, 2015: Attended NAAC assessors interaction Meeting and participated in mock evaluation of Institutes
at NAAC HQ, Bangalore
May, 2015: "Whither TCAF?" Invited talk at "Recent Trends of Study of Compact Objects - Theory and Observations",
in "Recent Trends in Compact Objects -II" conference at ARIES
June 2015: "Unique high energy astrophysics experiment with weather balloons", at 22nd PAC Symposium at Tromso, Norway
July 2015: Chairman of "Accretion Processes on Black Holes" at the 14th Marcel Grossman meeting in Rome and invited
talk at AC1 session
Sept. 2015: "Two Component Advective Flows: Theory and Observations" at the "100th Birth Centenary conference at St. Petersburg

II b Work With Students: In 2015 two students have submitted PhD Thesis. So far 30 PhD students have completed PhD work under my supervision and another 15 at various stages of completion (including three students is at the stage of writing thesis.)

II c Diploma thesis supervision

II d Other Teaching Duties: Took two courses on High Energy Astrophysics and introductory course on Astrophysics.

II e. Work With Postdocs; I work with 2 Post-Docs and several project scientists. I also work with two engineers, two technical assistants and two helpers in the balloon team.

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: Chaired/ Organized a Session at 14th MG meeting in Rome and presented an invited talk.

III b. Outside ICRANet: I am the Senior most faculty at S.N. Bose National Centre for Basic Sciences, and Head, Department of astrophysics and Cosmology. I am also In Charge of Indian Centre for Space Physics and handle over thirty faculties, engineers and research students

IV. Other

I am being awarded with Doctor of Science (D.Sc.) Award (Honaris Causa) by Gour Banga University during the convocation on the 10th December, 2015.

2014 List of Publications

(A) In refereed Journals

1 S. PALIT, T. BASAK and S.K. CHAKRABARTI, 2015, "Theoretical study of lower ionospheric response to solar flares: Sluggishness of D-region and Peak time delay", *Astrophys. \& Space Science*, 356, 19.

2 K. GIRI, S.K. GARAIN, S.K. CHAKRABARTI, 2015, Segregation of a Keplerian disc and sub-Keplerian halo from a Transonic flow around a Black Hole by Viscosity and Cooling processes, *MNRAS*, 448, 3221.

3 SIVARAMAN, B., RADHIKA, N., DAS, A., GOPAKUMAR, G., MAJUMDAR, L., S.K. CHAKRABARTI, SUBRAMANIAN, K. P., RAJA SEKHAR, B. N., HADA, M., 2015, Infrared Spectra and Chemical Abundance of Methyl Propionate in Icy Astrochemical Conditions, *MNRAS*, 448, 1372

4 S.K. CHAKRABARTI, MAJUMDAR, L., DAS, A. and CHAKRABARTI, S., 2015, Search for Interstellar Adenine, *Astrophysics and Space Science*, 357, 90

5 D. DEBNATH, MOLLA, A.A., S.K. CHAKRABARTI, MONDAL, S., 2015, Accretion flow dynamics of MAXI~J1659-152 with TCAF, *ApJ*, 803, 59

6 V. NWANKWO, S.K. CHAKRABARTI and Robert S. Weigel, 2015, Effects of Plasma Drag on Low Earth Orbiting Satellites due to Solar Forcing Induced Perturbations and Heating, *Advances of Space Research*, 56, 47

- 7 V. NWANKWO and S.K. CHAKRABARTI, 2014, Analysis of Planetary and Solar induced Perturbations on Trans-Martian Trajectory of Mars Missions before and after Mars Orbit Insertion, Ind. J. Physics 89 (12), 1235-1245\
- 8 DAS, A., MAJUMDAR, L., SAHU, D., GORAI, P., SIVARAMAN, B., S.K. CHAKRABARTI, 2015, Methyl Acetate and Its Singly Deuterated Isotopomers in the Interstellar Medium, ApJ, 808, 21
- 9 S.K. CHAKRABARTI, S. MONDAL \& D. DEBNATH, 2015, Resonance Condition and Quasi Periodic Oscillations Frequency of the Outbursting Source H 1743-322, ApJ, 452, 345
- 10 P. S. PAL and S.K. CHAKRABARTI, 2015, Comptonizing Efficiencies of IGR 17091-3624 and GRS 1915+105, Advances of Space Science, 56, 1784
- 11 S. NAGARKOTI \& S.K. CHAKRABARTI, 2015, Upper limit of viscosity parameter in Accretion flows around a black hole with shock waves, Astrophysical Journal (in press)
- 12 S. SASMAL, S. PALIT, S. CHAKRABARTI, 2015, Modeling of long path propagation characteristics of Very Low Frequency (VLF) radio waves as observed from Indian Antarctic station Maitri, JGR (in press)
- 13 L. MAJUMDAR, P. GORAI, A. DAS, S.K. CHAKRABARTI, 2015, Potential formation of three pyrimidine bases in interstellar regions, (in press)

(B) BOOKS

CHARDONNET Pascal

Position: Professeur des Universités
Adjunct Professor of the ICRANet Faculty
Period covered: 2015



I Scientific Work

The formation of the first stars hundreds of millions years after the Big-Bang marks the end of what it is called the « Dark Ages ». Currently, we have no direct observations on how the primordial stars formed. This new window is paramount of importance in astrophysics and cosmology. Certainly, the new generation of telescopes will test these theoretical ideas about the formation of the primordial stars. Today's telescopes cannot look far enough into the cosmic past to observe the formation of the first stars. If we want to see that process, we need sophisticated numerical simulations. Pop III stars also have a potential to produce gamma-ray bursts (GRBs). GRBs may provide one of the most promising methods of directly probing the final stages of Pop III stars.

In this proposal we intend to develop a numerical code to study the explosion of such massive stars and to develop observational consequences (astrophysical and cosmological) of these results to the Pop III stars. Hydrodynamical simulations will be performed with our own numerical code based on the Piecewise Parabolic Method on a Local stencil. Extension of PPML-code to full 3D case to study the 3D hydrodynamic effects on the explosion of a star with realistic physics. This includes implementation of full equation of state of the stellar matter, self-gravity computations, radiation transfer implementation.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

Andrey Baranov (2010-2013):

On Pair Instability Supernovae Explosion and Gamma-Ray Bursts

Now Andrey is researcher at Kurtchatov Institute Moscow

Anastasia Filina (2012-2015)

Explosive Phenomena in Astrophysics: Gamma-Ray Bursts and Supernovae

Now Anastasia is researcher in Keldysh Institute of Applied Mathematics Moscow.

II d Other Teaching Duties

Teaching activity at University of Savoie-PRES Université Grenoble

II e. Work With Postdocs

Mikhail Popov: Post-doc in LAPTH Annecy, then in CRAL ENS Lyon

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

Coordinator of EMJD IRAP PhD Program

Co-Advisor of Giovanni Pisanni

III b. Outside ICRANet

Russian Institute for Advanced Study, Moscow

Project on Art and Science

IV. Other

Project of Joint Euro Mediterranean Master on Big Data and Space Sciences with Emirates and Lebanon

2015 List of Publication

1) A.A. Baranov, P. Chardonnet, V.M. Chechetkin, A.A. Filina, M.V. Popov, **Aspherical Nucleosynthesis in the He-layer of a Core-collapse Supernova Using the Tracer Particles Method, 2013**

The Astrophysical Journal Volume 783 page 43 (2014)

2) A.A. Baranov, P. Chardonnet, V.M. Chechetkin, A.A. Filina, M.V. Popov, **Multidimensional Simulations of Pair-Instability Supernovae, 2013**

Astronomy & Astrophysics Volume 558 page A10 (2013)

Meeting

P. Chardonnet , A.A. Baranov, V.M. Chechetkin, A.A. Filina, M.V. Popov,

Gamma-Ray Bursts appear simpler than expected ?

IOFFE Conference, September 21-27, 2014, Saint-Petersburg, Russia

P. Chardonnet , A.A. Baranov, V.M. Chechetkin, A.A. Filina, M.V. Popov,

Cosmic Gamma-Ray Bursts from Primordial Stars: a new Renaissance in Astrophysics ?

Fourth Galileo-Xu Guangqi Meeting, May 5-8-, 2015, Beijing, China

P. Chardonnet , A.A. Baranov, V.M. Chechetkin, A.A. Filina, M.V. Popov,

On Gamma-Ray Bursts Spectra: a possible understanding

2nd Cesar Lattes Meeting, April 13-18, 2015, Rio de Janeiro Brazil

P. Chardonnet

Artium Mater in Relativistic Astrophysics: new perspective for a European-Latin American PhD Program

2nd Cesar Lattes Meeting, April 13-18, 2015, Rio de Janeiro Brazil

Einasto Jann

Position: Adjunct Professor of the Faculty

Period covered: 2009 - 2015



I Scientific Work

I completed the review on “Dark Matter” for the UNESCO Encyclopedia of Life Support Systems (EOLSS), available in arXiv, 0901.0632E. I wrote the book “Dark Matter and Cosmic Web Story”, published by World Scientific Publishing Co. (2014). The book describes the contributions that led to paradigm shifts on the dark matter and the cosmic web, the problems with the classical view, the attempts to solve them, and the difficulties encountered by new solutions.

In collaboration with Tartu and Potsdam astronomers I made several series of numerical simulations of structure evolution of the Universe. These simulations had several goals: to investigate the influence of density perturbations of different scale to structure formation and evolution, the role of phases to the formation of systems of galaxies of various scale, and explanation of absence of galaxies in voids. Our study of the evolution of density perturbations of various scales has led to the following conclusions: 1) The formation of the cosmic web with filaments and voids is due to the synchronisation of density waves of medium and large scales, and the amplification of both over- and under-dense regions, 2) *Voids* are regions in space where medium- and large-scale density waves combine in similar *under-density* phases, *clusters, filaments and superclusters* form in regions where density waves combine in similar *over-density* phases.

I participated in the analyze of the morphology of superclusters of galaxies in the Sloan Great Wall, in the study of the luminosity function of galaxies of the SDSS. Also we investigated the possibility to trace the cosmic web with quasar systems at redshifts range $1.0 < z < 1.8$. The diameters of quasar systems are comparable to the sizes of poor galaxy superclusters in the local Universe.

Together with collaborators we studied the distribution, masses, and dynamical properties of galaxy groups in the A2142 supercluster. The orientation of the axis of the cluster A2142 follows the orientations of its X-ray substructures and radio halo, and is aligned along the supercluster axis. We analysed the density contrasts for the turnaround, future collapse, and zero gravity in different CDM models. The analysis of the supercluster A2142 shows that its high-density core has already started to collapse. The zero-gravity line outlines the outer region of the main body of the supercluster. In the course of future evolution, the supercluster may split into several collapsing systems.

We searched for shell-like structures in the distribution of nearby rich clusters of galaxies drawn from the SDSS DR8. The radii of possible shells, 120 Mpc/h, are larger than expected for a BAO shell (about 109 Mpc/h), and they are determined by very rich galaxy clusters and superclusters with high density contrast, while BAO shells are barely seen in the galaxy distribution.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

2009: Zeldovich Memorial Meeting, Minsk (April, 19 – 25); Marcel Grossmann 12th Meeting, Paris (July, 12 – 19).

2010: 2nd Galileo-Xu Guangqi Meeting, Ventimiglia (July, 12 – 18).

2011: Conference “Expanding the Universe”, dedicated to the 200 anniversary of Tartu University Observatory (April, 27 – 29); Workshop “Cosmic Web Morphology and Topology”, Warsaw (July, 11 – 18).

2012: 13th Marcel Grossmann Meeting, Stockholm (July, 01 – 08); 26th Texas Symposium on Relativistic Astrophysics, Sao Paulo (December, 14 – 21).

2014: Conference “Zeldovich 100”, Moscow (June, 15 – 20); IAU Symposium No. 308 “The Zeldovich Universe: Genesis and Growth of the Cosmic Web”, Tallinn (June, 22 – 28).

2015: Conference “Drifting through the Cosmic Web: the Evolution of Galaxies within the Large Scale Structure”, Aix en Provance (July, 05 – 11).

II d Other Teaching Duties

2010: Lectures in the IRAP PhD Erasmus Mundus School, 6 - 10 September, Nice: 1. Large Scale Structure of the Universe I. Introduction; 2. Quantitative Analysis; 3. Dark Matter; 4. Cosmological Parameters and Dark Energy; 5. Formation and Evolution.

2011: Lectures on the IRAP PhD Erasmus Mundus School, September 12, Nice: 1. “Galactic models”; 2. “Formation of the cosmic web”; 3. “Evolution of the cosmic web”.

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 had lectures in the IRAP PhD Erasmus Mundus School in 2010 and 2011, also I participated in conferences organized by ICRANet (see above).

III b. Outside ICRANet

I participated in the work of the Centre of Excellence of Dark Matter in (Astro)particle Physics and Cosmology, and benefitted from Estonian Research Council grants IUT26-2, and IUT40-2.

IV. Other

Visits

For scientific cooperation I visited ICRANet Pescara seat (2009 - 2012), Astrophysics Institute Potsdam (2009, 2010), Johns Hopkins University Astronomy Department (2010), Byurakan Astrophysical Observatory (2012), Princeton University Astronomy Department (2014). I participated in Tartu-Tuorla Cosmology workshops in Estonia and Finland (2009 - 2015), and Warsaw Cosmology Workshop (2011).

Popularization of science

I had numerous popular lectures in Estonia, organized by Tartu University, Estonian Academy of Sciences, Estonian Radio and Television, Estonian schools, and by other organizations. Also I have published popular papers for the Calendar of Tartu Observatory.

Participation in scientific organizations

International Astronomical Union (1961); American Astronomical Society (1981); Estonian Academy of Sciences (1981); German Astronomical Society (1985); Academia Europaea (1990); European Astronomical Society (1990); Royal Astronomical Society (1994).

Awards

Estonian science prize (1982, 1998, 2003, 2007); The Order of the National Coat of Arms (1998); Marcel Grossmann Award (2009); University of Tartu honorary doctor (2010); Viktor Ambartsumian International Prize (2012); University of Turku honorary doctor (2013); Gruber Cosmology Prize (2014). The asteroid 11577 Einasto discovered in 1994 is named in his honour.

2015 List of Publication

Einasto, J. 2014, *Yakov Zeldovich and the Cosmic Web Paradigm*, ArXiv, 1410.6932

Einasto, M., Gramann, M., Saar, E., Liivamägi, L. J., Tempel, E., Nevalainen, J., Heinämäki, P., Park, C., & Einasto, J. 2015a, *Unusual A2142 supercluster with a collapsing core: distribution of light and mass*, A&A, 580, A69

Einasto, M., Heinämäki, P., Liivamägi, L. J., Martinez, V. J., Hurtado-Gil, L., Arnalte-Mur, P., Nurmi, P., Einasto, J., & Saar, E. 2015b, *Shell-like structures in our cosmic neighbourhood*, ArXiv, 1506.05295

Gramann, M., Einasto, M., Heinämäki, P., Teerikorpi, P., Saar, E., Nurmi, P., & Einasto, J. 2015, *Characteristic density contrasts in the evolution of superclusters. The case of A2142 supercluster*, A&A, 581, A135



Position: Professor University of Ferrara
Period covered: Jan- December 2015

I Scientific Work

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

- a. Gamma-ray lens development with long focal length (LAUE project);
- b. Studies of new gamma-ray burst missions
- c. Observational studies of GRB prompt emission;
- d. Observational review on hard X-ray astronomy.

II Conferences and educational activities

II a. Conferences and Other External Scientific Work

- a. *Outreaching conference, Soverato (Calabria), 19-21 March 2015*
- b. *Conference of Italian Astronomical Society (SAIT), Catania, 18-22 May 2015*
- c. *14th Marcel Grossmann Meeting, Roma, 12-18 July 2015*
- d. *Kick off meeting of the EU project AHEAD (Integrated Activities for the High Energy Astrophysics Domain), CNR Research AREA, Rome, 15-15 September 2015*

II b. Work With Students

yes, with

- a) *2 PhD students (Disba Sawant and Tais Maiolino), EMJD-IRAP-PhD program*
- b) *1 Master Student in Physics, Erica Cavallari, of the University of Ferrara*

II c Other Teaching Duties

One course at UNIFE, on “Measures and Observations of Celestial X- and gamma-rays” to Master Students in Physics.

II d. Work With Postdocs

Yes, with 1 PostDoc: E. Virgilli at the Physics and Earth Sciences Department, University of Ferrara

III. Service activities

III a. member of the IRAP-PhD Faculty

IV. Other

none

2015 List of Publications

Guidorzi, C.; Dichiaro, S.; Frontera, F.; Margutti, R.; Baldeschi, A.; Amati, L., A Common Stochastic Process Rules Gamma-ray Burst Prompt Emission and X-ray Flares, *The Astrophysical Journal*, Volume 801, Issue 1, article id. 57, 11 pp. (2015).

Ghirlanda, G.; Salvaterra, R.; Ghisellini, G.; Mereghetti, S.; Tagliaferri, G.; Campana, S.; Osborne, J. P.; O'Brien, P.; Tanvir, N.; Willingale, D.; Frontera, F.; and 11 coauthors, Accessing the population of high-redshift Gamma Ray Bursts, *Monthly Notices of the Royal Astronomical Society*, Volume 448, Issue 3, p.2514-2524 (2015).

M. Khalil, F. Frontera, E. Caroli, E. Virgilli, V. Valsan, A simulation study on the focal plane detector of the LAUE project, *Nuclear Instruments and Methods in Physics Research Section A*, Vol. 786, p. 59–70 (2015).

Buffagni, Elisa; Bonnini, Elisa; Ferrari, Claudio; Virgilli, Enrico; Frontera, Filippo, X-ray characterization of curved crystals for hard x-ray astronomy, *Proceedings of the SPIE*, Volume 9510, id. 951006 10 pp. (2015).

Virgilli, E.; Frontera, F.; Rosati, P.; Liccardo, V.; Squerzanti, S.; Carassiti, V.; Caroli, E.; Auricchio, N.; Stephen, J. B., Hard x-ray broad band Laue lenses (80 - 600 keV): building methods and performances, *Proceedings of the SPIE*, Volume 9510, eprint arXiv:1509.03416 (2015).

Frontera, Filippo, GRB Afterglow Discovery with BeppoSAX: its Story 15 Years Later, *Proceedings of the MG13 Meeting on General Relativity* (in 3 Volumes). Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN No. 9789814623995, pp. 33-53 (2015).

Liccardo, V.; Frontera, F.; Virgilli, E.; Valsan, V., New Developments in the Laue Project, *Proceedings of the MG13 Meeting on General Relativity* (in 3 Volumes). Edited by ROSQUIST KJELL ET AL.

Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN No. 9789814623995, pp. 881-888 (2015).

Amati, Lorenzo; Campana, Riccardo; Evangelista, Yuri; Feroci, Marco; Fuschino, Fabio; Labanti, Claudio; Salvaterra, Ruben; Stratta, Giulia; Tagliaferri, Gianpiero; Frontera, Filippo; and 12 coauthors, Game: GRB and All-Sky Monitor Experiment, Proceedings of the MG13 Meeting on General Relativity (in 3 Volumes). Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN No. 9789814623995, pp. 889-901 (2015).

Fryer Chris L.

Position: Scientist 5
Adjunct Professor of the ICRANet
Faculty
Period covered: Jan. 1, 2015 – Dec. 1, 2015



I Scientific Work

Fryer studies a wide range of astrophysics focusing primarily on supernovae, compact objects, nucleosynthetic yields and gamma-ray bursts as well as high-energy density plasma physics.

II Conferences and educational activities

II a Conferences and Other External Scientific Work: Chris co-organized a session in the MG15 meeting, gave plenary talks at MG15, invited talks at MLAPP, Benz, LAUGA meetings, and colloquia at Harvard, MIT and Univ. Manitoba in 2015.

II b Work With Students: Chris Fryer co-mentored 4 students in 2015: Sydney Andrews, Janie De La Rosa, Cole Kendrick, Tim Waters

II c Diploma thesis supervision: Chris Fryer is co-supervising the thesis of Janie De La Rosa

II d Other Teaching Duties

II e. Work With Postdocs: Chris mentored 3 post-docs in 2015: Josh Dolence, Brendan Krueger, Chris Malone.

III. Service activities

III a. Within ICRANet: Chris co-organized a session at MG15.

III b. Outside ICRANet: Chris is co-PI of NuGrid, the PI of the rad-flow campaign at LANL and serves on the executive board of the Center for Non-Linear Studies, advisory boards of Institutional Computing and NPAC (Nuclear Particle Astrophysics and Cosmology).

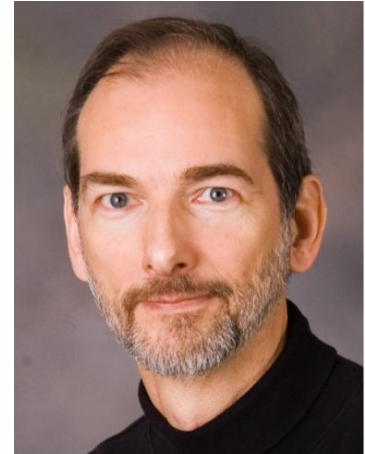
IV. Other

APS Fellow (2008), LANL Fellow (2014), Lawrence Award (2014)

2015 List of Publication

- 1) Becerra, L., Cipolletta, F., Fryer, C.L., Rueda, J.A., & Ruffini, R. 2015, ApJ, 812, 100
- 2) Fryer, C.~L., Belczynski, K., Ramirez-Ruiz, E., et al. 2015, ApJ, 812, 24
- 3) Pignatari, M., Zinner, E., Hoppe, P., et al. 2015, ApJL, 808, L43
- 4) Dominik, M., Berti, E., O'Shaughnessy, R., et al. 2015, ApJ, 806, 263
- 5) Bayless, A.J., Even, W., Frey, L.~H., et al. 2015, ApJ, 805, 98
- 6) Boggs, S.E., Harrison, F.A., Miyasaka, H., et al. 2015, Science, 348, 670
- 7) Jones, S., Hirschi, R., Pignatari, M., et al. 2015, MNRAS, 447, 3115
- 8) Grefenstette, B.W., Reynolds, S.P., Harrison, F.A., et al. 2015, ApJ, 802, 15
- 9) Whalen, D.J., Smidt, J., Heger, A., et al. 2015, ApJ, 801, 71
- 10) Madsen, K.K., Reynolds, S., Harrison, F., et al. 2015, ApJ, 801, 66
- 11) Zoglauer, A., Reynolds, S. P., An, H., et al. 2015, ApJ, 798, 98

Jantzen Robert



Position: **Professor**

Period covered: **Summer 2014 through Summer 2015**

I Scientific Work

Continuing collaboration with Donato Bini and Andrea Geralico on mathematical properties of stationary spacetimes and relativistic Poynting-Robertson effects.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

MG14 co-organizer, Italo-Korea IK14 talk

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

Dr. E. Bittencourt (CAPES, Brazil and ICRANet)

Dr. Andrea Geralico (CNR)

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

Continuing MG14 editorial duties, MG14 organizational work

III b. Outside ICRANet

IV. Other

Summer 2014 through Fall 2015 List of Publications

Slicing black hole spacetimes,

D. Bini, E. Bittencourt, A. Geralico and R.T. Jantzen,

International Journal of Geometric Methods in Modern Physics 12, 1550070-1550101 (2015).

Jetzer Philippe

University of Zurich, Switzerland

Position: Professor

Period covered: 2015



I. Service activities

III b. Outside ICRANet

Lecture on: “Mathematical Methods in Physics” during the Spring semester 2015 at University of Zurich

2015 List of Publication

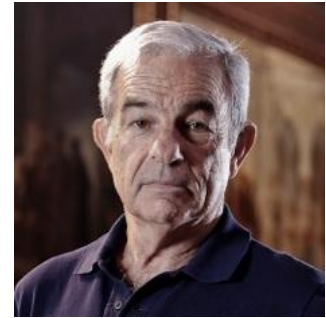
1. “Planck view of the M82 galaxy” with V.G. Gurzadyan et al., *Astron.Astrophys.* 582 (2015) A77.
2. “Effective-one-body Hamiltonian with next-to-leading order spin-spin coupling” with Simone Balmelli, *Phys.Rev. D91* (2015) 064011.
3. “Testing General Relativity and Alternative Theories of Gravity with Space-based Atomic Clocks and Atom Interferometers” with Ruxandra Bondarescu, Andreas Schärer, Philippe Jetzer, Raymond Angélil, Prasenjit Saha, Andrew Lundgren, *EPJ Web Conf.* 95 (2015) 02002.
4. “Supermassive Black Hole Tests of General Relativity with eLISA” with Cédric Huwyler, Edward K. Porter, Philippe Jetzer, *Phys.Rev. D91* (2015) 2, 024037

Mirabel Félix

Present Position:

Conseiller Scientifique au CEA-France &
Investigador Superior CONICET-Argentina

Adjunct Professor of the ICRANet Faculty



Past positions:

- ☐ Representative and Head of the Office of Science in Chile of the European Southern Observatories
- ☐ Directeur de Recherches. Commissariat à l'Energie Atomique et aux Energies Alternatives. France
- ☐ Researcher "Superior" of the National Research Council. Argentina
- ☐ Professor (Associate - Full). Univ. of Puerto Rico, USA
- ☐ Guggenheim Fellow. California Institute of Technology. USA
- ☐ Associate Researcher. University of Maryland. USA
- ☐ Post-doctoral Researcher. University of Manchester. UK
- ☐ Fellow of the National Research Council. Argentina

Distinctions:

- ☐ Doctor Honoris Causa. University of Barcelona (2004). [Discurso de Investidura](#). ([Reduced version](#) in English published by the French Academy of Sciences)
- ☐ Rossi Prize of the High Energy Division. American Astronomical Society (1996).
- ☐ Grand Prix Deslandres. French National Academy of Sciences (2011).
- ☐ Houssay Prize for the Trajectory in Science and Technology. Ministry of Science and Technology of Argentina (2011).
- ☐ National Award in Physics. French Commission for Atomic & Alternative Energies (1995).
- ☐ Prix Konex 2013. One of the five most productive argentine scientists in Physics and Astronomy during the last decade.
- ☐ Consecration Prize. National Academy of Exact Sciences, Physical and Natural Sciences of Argentina (2010).
- ☐ Guggenheim Foundation Fellow. California Institute of Technology (1989).
- ☐ Productivity Awards. National Science Foundation-EPSCOR (USA) (1988 and 1989).
- ☐ Member of the National Academy of Exact Sciences, Physical and Natural Sciences of Argentina (2011).
- ☐ Member of the World Academy of Sciences (TWAS) - for the Advancement of Science in developing countries (2015)

I Scientific Work

Lead the discoveries of **Microquasars**, the **Apparent Superluminous Motions in the Galaxy**, and initiated the multiwavelength ground base research that lead to the discovery of **Luminous Infrared Galaxies** and **Tidal Dwarf Galaxies**.

Current areas of research:

- ☐ High Energy Astrophysics
- ☐ Extragalactic Astronomy
- ☐ Cosmology

II Conferences and educational activities

II a Conferences and Other External Scientific Work

About 6 per year

II b Work With Students

Animate science discussions at IAFE-Argentina and CEA-France

II c Diploma thesis supervision

Co-direct the thesis of Vanesa Douna on the Role of High Energy Sources in Cosmic Evolution

II d Other Teaching Duties

Several

II e. Work With Postdocs

Several

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...)*]

None until 15 November 2015

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2015 List of Publication

Publications:

- ☐ 612 (325 in refereed journals) with more than 16.100 citations
- ☐ Index h = 56 (Based on SAO/NASA Astrophysics Data System)

In 2015:

- **Metallicity dependence of high-mass X-ray binary populations**

V. M. Douna^{1;2}, L. J. Pellizza³, I. F. Mirabel^{1;4}, and S. E. Pedrosa¹

A&A 579, A44 (2015)

- Jet-induced star formation by a microquasar

Authors: [I. F. Mirabel](#), [S. Chaty](#), [L.F. Rodriguez](#), [M. Sauvage](#)

Proceedings of the IAU Symposium No. 313: 'Extragalactic jets from every angle', Galapagos, Ecuador, 15-19 September 2014, F. Massaro, C. C. Cheung, E. Lopez, and A. Siemiginowska (Eds.), Cambridge University Press

- CTA Contributions to the 34th International Cosmic Ray Conference (ICRC2015)

[2015arXiv150805894C](#)

Punsly Brian



Position: Research Scientist
Period covered: 10/2014-10/2015

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 2014-2015. The research was directed at finding environmental factors that are related to the switch-on of the general relativistic engine responsible for a few percent of quasars driving powerful relativistic jets. This is important since this will relate directly to constraints on the initial state and boundary conditions on numerical models of black hole driven jets.

2. Coordinated NUSTAR, XMM and VLBA Multi-Epoch Observations of Mrk 231 During a Radio Flare

I am leading an international effort to study Mrk 231 during a radio flare with the highest resolution radio interferometry and in the X-ray band. This nearby quasar is in the process of transitioning from a radio quiet quasar to a radio loud quasar. A flare was detected during our Arc Minute MicroKelvin array monitoring at 17.6 GHz. This research is being done in collaboration with Cormac Reynolds and Natasha Hurley-Walker (Curtin University of Technology, Department of Imaging and Applied Physics), Christopher P. O'Dea (Department of Physics, Rochester Institute of Technology) and Giovanni Miniutti (Centro de Astrobiología (CSIC-INTA), Dep. de Astrofísica, European Space Astronomy Centre Madrid Spain).

Abstract

On 3/26/2015 we began a target of opportunity VLBA 4 –epoch monitoring at 8.4, 15, 22 and 43 GHz of a high frequency flare in the nearby quasar MRK231. The observations were spread out through May. The primary goals are to detect superluminal motion, estimate the internal energy of the flare from the spectrum and component sizes, and monitor the temporal evolution in order to understand the energy injection mechanism (rise) and the cooling mechanism (decay). The first three epochs had observations by NuSTAR in addition to VLBA and the last three epochs were observed with XMM. The data is currently being processed.

Background

From previous VLBA studies of MRK231 in Reynolds et al (2009) and other RQ (radio quiet) quasar studies, we have seen that RQ AGN can have relativistic outflows with significant kinetic luminosities (but maybe for short periods of time). So this raises the question what is it that makes some sources RQ and others radio loud (RL)? At a redshift of 0.042, MRK231 is one of the nearest radio quiet quasars to earth. The radio core is perhaps the brightest of any radio quiet quasar at high frequency (22 and 43 GHz). The combination of significant 43 GHz flux density and its proximity to earth makes MRK231 the optimal radio quiet quasar for study with VLBA. No other radio quiet quasar central engine can be explored with such high resolution, so it is ideal for studying the high kinetic luminosity relativistic ejecta in radio quiet quasars. 43 GHz VLBA observations can fully resolve nuclear structure to within 3.5×10^{17} cm. We use sensitive high resolution observations to study the temporal evolution of the size and spectrum of a strong flare in MRK231 in order to shed light on why such strong flares cool off and never link to large scale powerful radio lobes.

3. Determining the Location of Relativistic Jet Launching in Quasars

The nature of the causative agent that makes some quasars radio loud (RLQs) has challenged astrophysicists for more than 50 years. It became clear early on that the optical/ultraviolet (UV) spectra of RLQs and radio quiet quasars (RQs) are very similar. Attempts to look for subtle differences involved statistical studies of optical and UV emission line strengths and widths. These emission regions are far from the central engine, many thousand times larger than the central black hole radius, so it is not clear what they tell us as a second order indicator of conditions in the jet launching region. Are they related to the fueling mechanism for radio loudness, the ionization continuum or jet propagation? Consequently, this research path has provided very little understanding of the jet launching mechanism. Seemingly more relevant to the physics of jet launching, the extreme ultraviolet (EUV) continuum, wavelength less than 1100 Angstroms, is created orders of magnitude closer to the central engine and RLQs display significant EUV continuum deficit relative to RQs. We have explored this in a series of new ApJ and MNRAS articles.

3A. Evidence of the Dynamics of Relativistic Jet Launching in Quasars

ABSTRACT:

Hubble Space Telescope (HST) spectra of the EUV, the optically thick emission from the innermost accretion flow onto the central supermassive black hole, indicate that radio loud quasars (RLQs) tend to be EUV weak compared to the radio quiet quasars; yet the remainder of the optically thick thermal continuum is indistinguishable. The deficit of EUV emission in RLQs has a straightforward interpretation as a missing or a suppressed innermost region of local energy dissipation in the accretion flow. This article is an examination of the evidence for a distribution of magnetic flux tubes in the innermost accretion flow that results in magnetically arrested accretion (MAA) and creates the EUV deficit. These same flux tubes and possibly the interior magnetic flux that they encircle are the source of the jet power as well. In the MAA scenario, islands of large scale magnetic vertical flux perforate the innermost accretion flow of RLQs. The first prediction of the theory that is supported by the HST data is that the strength of the (large scale poloidal magnetic fields) jets in the MAA region is regulated by the ram pressure of the accretion flow in the quasar environment. The second prediction that is supported by the HST data is that the rotating magnetic islands remove energy from the accretion flow

as a Poynting flux dominated jet in proportion to the square of the fraction of the EUV emitting gas that is displaced by these islands

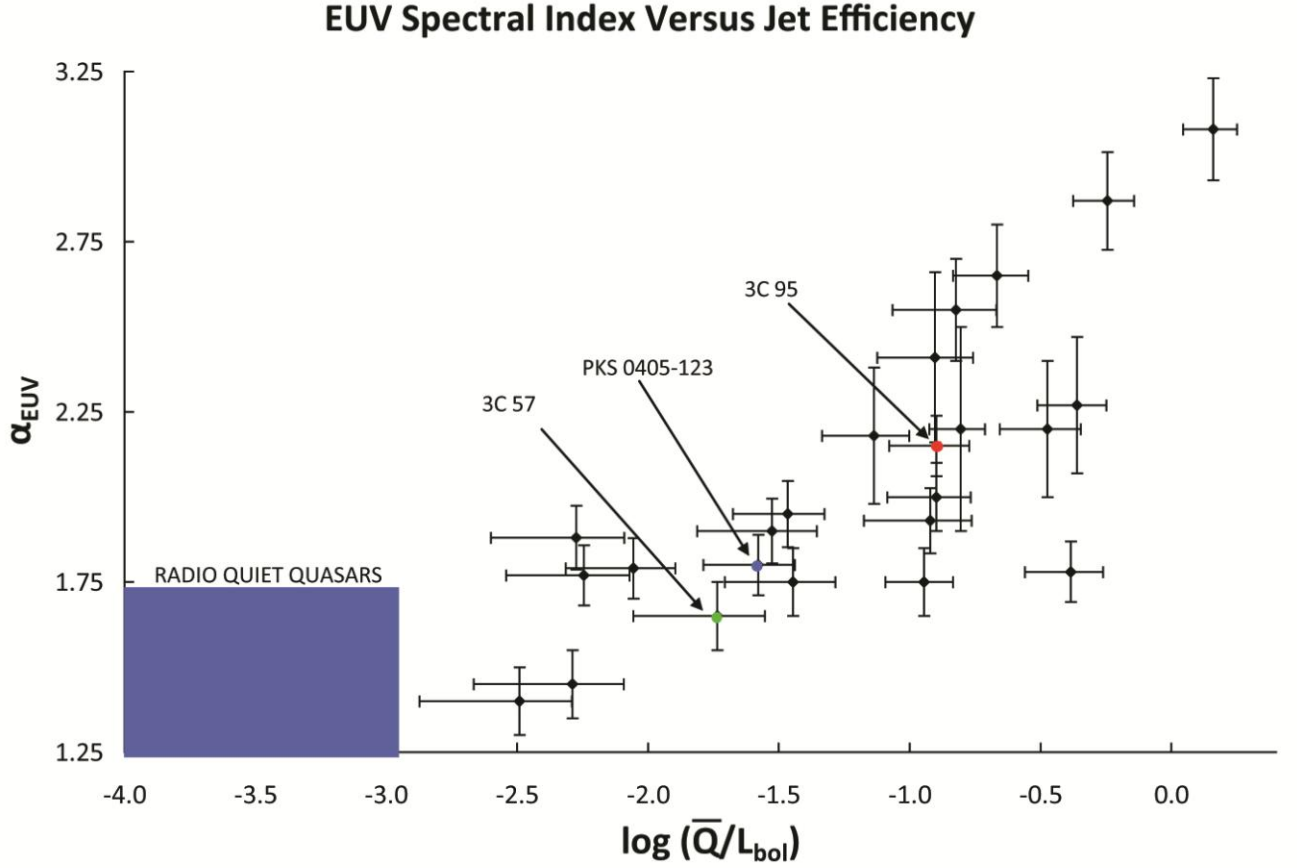


Figure 1. The correlation of the long term time averaged jet power normalized by the bolometric luminosity of the accretion flow in radio loud quasars with the EUV spectral index. A larger spectral index means a steeper spectrum and a larger EUV deficit relative to radio quiet quasar with a spectral index of about 1.57.

3B. The Extreme Ultraviolet Deficit: Jet Connection in the Quasar 1442+101

This research was an attempt to see if the long term time averaged affect described above was evident in the time evolution of an individual radio loud quasar. The collaboration included the efforts from Cormac Reynolds (Curtin University of Technology, Department of Imaging and Applied Physics), Christopher P. O'Dea (Department of Physics and Astronomy, University of Manitoba, Winnipeg, MB R3T 2N2 Canada, Paola Marziani (INAF, Osservatorio Astronomico di Padova, Italia), Preeti Kharb (Indian Institute of Astrophysics, II Block, Koramangala, Bangalore) and Marianne Vestergaard (Dark Cosmology Centre, Niels Bohr Institute, University of Copenhagen)

ABSTRACT: In previous studies, it has been shown that the long-term time-averaged jet power, \mathcal{Q} , is correlated with spectral index in the extreme ultraviolet (EUV), α_{EUV} (defined by $F_{\nu} \sim \nu^{-\alpha_{\text{EUV}}}$ computed between 700 and 1100 Å). Larger \mathcal{Q} tends to decrease the EUV emission. This is curious relationship

because it connects a long-term average over ~ 106 years with an instantaneous measurement of the EUV. The EUV appears to emit adjacent to the central supermassive black hole and the most straightforward explanation of this correlation is that the EUV-emitting region interacts in real time with the jet-launching mechanism. Alternatively stated, the $Q - \alpha_{\text{EUV}}$ correlation is a manifestation of a contemporaneous (real time) jet power, $Q(t)$, correlation with α_{EUV} . In order to explore this possibility, this paper considers the time variability of the strong radio jet of quasar 1442+101, which is not aberrated by strong Doppler enhancement. This high-redshift ($z = 3.55$) quasar is uniquely suited for this endeavor as the EUV is redshifted into the optical observing window allowing for convenient monitoring. More importantly, it is bright enough to be seen through the Lyman forest and its radio flux is strong enough that it has been monitored frequently. Quasi-simultaneous monitoring (five epochs spanning ~ 40 years) show that increases in $Q(t)$ correspond to decreases in the EUV as expected.

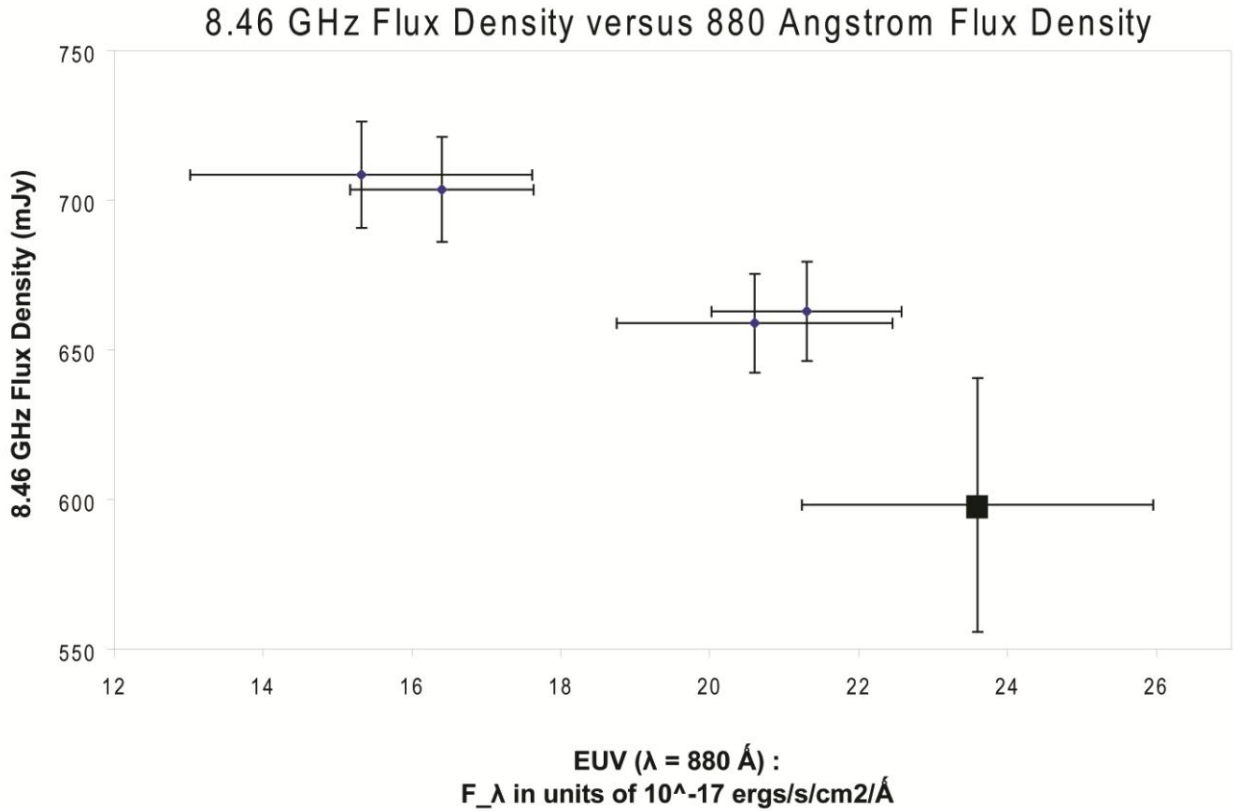


Figure 2. The quasar 1442+101 shows the correlation between jet power and the decrement of EUV emission in real time.

3C. The extreme ultraviolet spectrum of the kinetically dominated quasar 3C 270.

ABSTRACT: Only a handful of quasars have been identified as kinetically dominated, their long-term time-averaged jet power, Q , exceeds the bolometric thermal emission, L_{bol} , associated with the accretion flow. This Letter presents the first extreme ultraviolet (EUV) spectrum of a kinetically dominated quasar, 3C 270.1. The EUV continuum flux density of 3C 270.1 is very steep, $F_\nu \sim \nu^{-a_{\text{EUV}}}$, $a_{\text{EUV}} = 2.98 \pm 0.15$. This value is consistent with the correlation of Q/L_{bol} , and a_{EUV} found in previous studies of the

EUV continuum of quasars, the EUV deficit of radio loud quasars. Curiously, although ultraviolet broad absorption line (BAL) troughs in quasar spectra are anticorrelated with Q , 3C 270.1 has been considered a BAL quasar based on an SDSS spectrum. This claim is examined in terms of the EUV spectrum of OVI and the highest resolution C IV spectrum in the archival data and the SDSS spectrum. First, from [O III]4959,5007 (IR) observations and the UV spectral lines, it is concluded that the correct redshift for 3C 270.1 is 1.5266. It is then found that the standard measure of broad absorption, BALnicity = 0, for Mg II 2800, C IV 1549 and OVI 1032 in all epochs.

2015 List of Publication

Punsly, Brian; Marziani, Paola., The extreme ultraviolet spectrum of the kinetically dominated quasar 3C 270.1 2015 MNRAS 453L 16

Punsly, Brian; Marziani, Paola; Kharb, Preeti; O'Dea, Christopher P.; Vestergaard, Marianne, The Extreme Ultraviolet Deficit: Jet Connection in the Quasar 1442+101 2015 ApJ 812 79

Punsly, B., . Evidence of the Dynamics of Relativistic Jet Launching in Quasars 2015 ApJ 806 47

Quevedo Hernando

Position: Full Professor - National Autonomous
University of Mexico
Period covered: 2015



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

- Visit: New Granada Military University, Bogotá, Colombia (June 14 – 16, 2015)
- Conference: Geometry and its Applications, course: Geometrothermodynamics and its applications Bogotá, Colombia (June 17 – 21, 2015)
- Conference: XIIth International Conference on Gravitation, Astrophysics and Cosmology (ICGAC-12), plenary talk: "Geometrothermodynamic emergent gravity" Moscow, Russia (June 27 – July 7, 2015)
- Conference: 14th Marcel Grossmann Meeting, talk: "Cosmological models based on geometrothermodynamics" Rome, Italy (July 12 – 18, 2015)
- Visit: Sapienza-Università di Roma (July 19 – August 3, 2015)
- Research stay at Al Farabi Kazakh National University (Almaty, Kazakhstan, September 1 – 30, 2015)
- XII Xalapa Meeting, invited talk: "Geometrothermodynamics in relativistic cosmology" Xalapa, Mexico (October 21- 24, 2015)
- Conference: Light, Astronomy and Relativity to everyone invited talks: "What is our universe and what is it ?", "How widespread Einstein's special theory of relativity?", "Geometrothermodynamics and its applications" Barranquilla, Colombia (November 3 – 7, 2015)
- Visit: New Granada Military University, Bogotá, Colombia (November 8 – 16, 2015)

II b Work With Students

II c Diploma thesis supervision

- Viridiana Pineda (PhD)
Topic: Microscopic models for black holes
- Daniel Flores (PhD)
Topic: Topological quantization of minisuperspaces
- Selene Cruz (PhD)
Topic: Diffeomorphism invariance in topological quantization
- Pedro Sánchez (MSc)
Topic: Geometrothermodynamics in relativistic astrophysics
- Juan José Vega (MSc)
Topic: Topological quantization of mechanical systems

II d Other Teaching Duties

II e. Work With Postdocs

- Alessandro Bravetti, Cesar Lopez, Christine Gruber (all postdocs at UNAM)

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: General Relativity at UNAM

IV. Other

2015 List of Publication

RELATIVISTIC LIKE STRUCTURE OF CLASSICAL THERMODYNAMICS

H. Quevedo, A. Sanchez and A. Vazquez

GENERAL RELATIVITY AND GRAVITATION 4, 36 (2015)

DOI: 10.1007/s10714-015-1881-9

GENERATING STATIC PERFECT-FLUID SOLUTIONS OF EINSTEIN'S EQUATIONS

H. Quevedo and S. Toktarbay

JOURNAL OF MATHEMATICAL PHYSICS 56, 052502 (2015)

DOI: 10.1063/1.4921062

THE ERGOREGION IN THE KERR SPACETIME: PROPERTIES OF THE EQUATORIAL CIRCULAR MOTION

D. Pugliese and H. Quevedo

EUROPEAN PHYSICAL JOURNAL C 75, 234 (2015)

DOI: 10.1140/epjc/s10052-015-3455-0

THERMODYNAMICS AND GEOMETROTHERMODYNAMICS OF BORN-INFELD BLACK HOLES WITH COSMOLOGICAL CONSTANT

H. Quevedo, M. N. Quevedo and A. Sanchez

INTERNATIONAL JOURNAL OF MODERN PHYSICS D 24, 1550092 (2015)

DOI: 10.1142/S0218271815500923

MAXIMALLY SYMMETRIC SPACETIMES EMERGING FROM THERMODYNAMIC FLUCTUATIONS

A. Bravetti, C.S. Lopez-Monsalvo, and H. Quevedo

e-Print: arXiv:1503.08358 [gr-qc]

SELF-ACCELERATED UNIVERSE INDUCED BY REPULSIVE EFFECTS AS AN ALTERNATIVE TO DARK ENERGY AND MODIFIED GRAVITIES

O. Luongo and H. Quevedo

e-Print: arXiv:1507.06446 [gr-qc]

MOTION OF TEST PARTICLES IN THE FIELD OF A NAKED SINGULARITY

K. Boshkayev, E. Gasperin, A.C. Gutierrez-Pineros, H. Quevedo and S. Toktarbay

e-Print: arXiv:1509.03827 [gr-qc]

GEODESICS IN THE FIELD OF A ROTATING DEFORMED GRAVITATIONAL SOURCE

K. Boshkayev, H. Quevedo, M. Abutalip, Z. Kalymova and S. Suleymanova

e-Print: arXiv:1510.02016 [gr-qc]

ON THE EQUIVALENCE OF APPROXIMATE STATIONARY AXIALLY SYMMETRIC SOLUTIONS OF EINSTEIN FIELD EQUATIONS

K. Boshkayev, H. Quevedo, S. Toktarbay and B. Zhami.

e-Print: arXiv:1510.02035 [gr-qc]

ACCRETION DISKS AROUND A MASS WITH QUADRUPOLE

M. Abishev, K. Boshkayev, H. Quevedo and S Toktarbay.

e-Print: arXiv:1510.03696 [gr-qc]

A PERFECT-FLUID SPACETIME FOR A SLIGHTLY DEFORMED MASS

M. Abishev, K. Boshkayev, H. Quevedo and S. Toktarbay.

e-Print: arXiv:1510.03699 [gr-qc]

ORBITAL STABILITY OF THE RESTRICTED THREE BODY PROBLEM IN GENERAL RELATIVITY

M. Abishev, H. Quevedo, S. Toktarbay and B. Zhami

e-Print: arXiv:1510.03703 [gr-qc]

Lecturers

Aksenov Alexey



Position: Senior scientific staff member

Dep. of Comp. Methods, Information and Management

Institute for Computer-Aided Design, RAS,

Moscow

Scientific Work

Collapse of stars cores, neutrino transport, multidimensional multi-temperature hydrodynamic simulations, simulations of the countercurrent in a gas centrifuge, one dimensional radiative transfer codes, a numerical modeling of electron-positron pairs and photons transfer, etc.

II Conferences and educational activities

2015: MG14 Rome, July, 2015

III Service activities

Within ICRANet

Co-chair (SN2) Numerical simulations, SN, and GRB, connecting with massive SN in MG14

Outside ICRANet

1989—1992 engineer, Laboratory for Astrophysics and Plasma Physics of the Institute for Theoretical and Experimental Physics (ITEP); 1992—1999 Junior sci. staff member, ITEP; 1999—2008 scientific staff member, ITEP; 2008—now Senior scientific staff member, department for mathematical modeling and turbulence, Institute for Computer-Aid design, Russian academy of Sciences.

2015 List of Publications

1. Aksenov A.G.; Ruffini R.; Vereshchagin G.V. “Radiative transfer in relativistic plasma outflows and comptonization of photons near the photosphere”, *Astron. Rep.*, 2015, v. 59, pp. 418—424
2. Aksenov, A.G. “Computation of Shock Waves in Plasma”, *Comp. Math. and Math. Phys.*, 2015, v. 55, pp. 1752–1769
3. Aksenov, A. G.; Ruffini, R.; Vereshchagin, G. V. “Radiative Transfer Near the Photosphere of Mildly and Ultrarelativistic Outflows”// *Proceedings of the MG13 Meeting*. Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015., pp. 1754-1756
4. Aksenov, A. G.; Chechetkin, V. M. “Computations of the Gravitational Collapse of a Stellar Core with Neutrinos Transport and the Problem of Supernovae”// *Proceedings of the MG13 Meeting*. Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN #9789814623995, pp. 2381-2383

Bini Donato

Position: Reasercher (permanent position) at
Istituto per le Applicazioni del Calcolo,
“M. Picone,” CNR
Via dei Taurini, 19 I-00185 Roma
Period covered: 1995 -today.



I Scientific Work

The main topic of my interest is General Relativity with special attention to several classical aspects, like the analysis and the interpretation of exact solutions of Einstein's field equations.

In particular, I'm interested in 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 astrometry and 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.

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)

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.

Work With Postdocs

A Geralico (University of Rome “La Sapienza” and ICRANet)

E. Bittencourt (CAPES, Brazil and ICRANet)

III Service activities

Scientific collaboration with:

Prof. R. Ruffini (University of Rome, Italy and ICRANet);

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

Outside ICRANet

Scientific collaboration with:

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

Prof. F. de Felice (University of Padova, Italy);

Dr. A. Ortolan (INFN Legnaro, Padova, Italy);

Other

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 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*

2015 List of publications

- 1) Bini D. and Geralico A.,
Effect of an arbitrary spin orientation on the quadrupolar structure of an extended body in a Schwarzschild spacetime,
Phys. Rev. D 91, 104036 (2015)
- 2) Bini D. and Geralico A.,
Tidal invariants along the world line of an extended body in the Kerr spacetime,
Phys. Rev. D 91, 084012 (2015).
- 3) Bini D. and Damour T.,
Detweiler's gauge-invariant redshift variable: analytic determination of the nine and nine-and-a-half post-Newtonian self-force contributions,
Phys. Rev. D 91, 064050 (2015)
[arXiv:1502.02450 [gr-qc]].
- 4) Bini D., Mashhoon B.,
Weitzenbock's Torsion, Fermi Coordinates and Adapted Frames,
Phys. Rev. D 91, 084026 (2015)
[arXiv:1502.04183 [gr-qc]].
- 5) Bini D., Bittencourt E., Geralico A. and Jantzen R.T.,
Slicing black hole spacetimes,
International Journal of Geometric Methods in Modern Physics 12, 1550070 (2015)

- 6) Bini D. and Damour T.,
Analytic determination of high-order post-Newtonian self-force contributions to gravitational spin precession,
Phys. Rev. D 91, 064064 (2015)
[arXiv:1503.01272 [gr-qc]]
- 7) Bini D., Iorio L. and Giordano D.,
Orbital effects due to gravitational induction,
General Relativity and Gravitation 47, 130 (2015).
- 8) Bini D., Bittencourt E. and Geralico A.,
Massless Dirac particles in the vacuum C-metric,
Classical and Quantum Gravity 32, 215010 (2015).
- 9) Bini D., de Felice F.,
Chronology protection in the Kerr metric,
General Relativity and Gravitation 47, 131 (2015)
- 10) Bini D., Faye G. and Geralico A.,
Dynamics of extended bodies in a Kerr spacetime with spin-induced quadrupole tensor,
Phys. Rev. D 92, 104003 (2015)

Submitted papers

- 11) Bini D. and Mashhoon B.,
Nonlocal Gravity: Conformally Flat Spacetimes,
Classical and Quantum Gravity, submitted
- 12) Bini D., Esposito G. and Geralico A.,
Late time evolution of cosmological models with non-ideal fluids,
Phys. Rev. D, submitted
- 13) Bini D., Damour T. and Geralico A.,
Spin-dependent two-body interactions from gravitational self-force computations,
Phys. Rev. D, submitted
- 14) Bini D., Geralico A., Gregoris D., Mocz P., Succi S.,
CMB constraints on cosmological models with fluids obeying a Shan-Chen-like equation of state,
General Relativity and Gravitation, submitted
- 15) Bini D., Damour T. and Geralico A.,
Confirming and improving post-Newtonian and effective-one-body results from self-force computations along eccentric orbits around a Schwarzschild black hole,
Phys. Rev. D, submitted

Filippi Simonetta

Position: **Full Professor** in Mathematical Physics (MAT/07).

Head, Laboratory of Non Linear Physics and Mathematical Modeling

Pro-Rector for Education, University “Campus Bio-Medico”,

Via A. del Portillo 21, I-001285 Rome, Italy,

Tel. +39-06-225419611

Email: s.filippi@unicampus.it

Membership: American Physical Society



I Scientific Work

- Astrophysics of self-gravitating fluids.
- Cosmology.
- Numerical Relativity.
- Fluid Dynamics
- Theoretical Biophysics.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

- Prof. Filippi, together with Dr. Christian Cherubini, is working with the IRAP PhD student Federico Cipolletta on neutron stars theory and numerical methods for obtaining rotating and self-gravitating classical and relativistic equilibrium configurations.

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

Prof. Filippi is working with Dr. Cherubini and Dr. Jorge Rueda on numerical relativity applied to rotating fluids.

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.

III b. Outside ICRANet

2014/15 Lecturer "Mechanics and Thermodynamics" (Engineering Department,
University Campus Bio-Medico of Rome).

2014/15 Lecturer "Dynamics of Complex Systems" (Engineering Department,
University Campus Bio-Medico of Rome).

2014/15 Lecturer "Mathematical Physics Models for Engineering" (Engineering Faculty,
University Campus Bio-Medico of Rome).

- Faculty of the BIOENGINEERING AND BIOSCIENCES 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 plenty articles on various aspects of Gravitational Physics. With Dr Christian Cherubini, Dr Andrea Geralico and Dr Donato Bini she has been involved in research activities in the fields of Stellar and Galactic Structures, Effective Geometries and Complex Systems in Nature.

2015 List of Publications

- 1) Cherubini C., Filippi S., Gizzi A. Loppini, A. "Role of topology in complex functional networks of beta Cells" Physical Review E, Volume 92, Issue 4, 5 October 2015, Article number 042702.
- 2) Cipolletta F., Cherubini C., Filippi S., Rueda J.A., Ruffini R. "Fast rotating neutron stars with realistic nuclear matter equation of state" Physical Review D - Particles, Fields, Gravitation and Cosmology Volume 92, Issue 2, 13 July 2015, Article number 023007.

- 3) Bertolaso M., Capolupo A., Cherubini C., Filippi S., Gizzi A., Loppini A., Vitiello G, "The role of coherence in emergent behavior of biological systems" *Electromagnetic Biology and Medicine* Volume 34, Issue 2, 1 June 2015, Pages 138-140.
- 4) Cherubini C., Filippi S., Gizzi A., Nestola M.G.C., "On the Wall Shear Stress Gradient in Fluid Dynamics" *Communications in Computational Physics*, Volume: 17, 2015 Issue: 3 Pages: 808-821
- 5) Gizzi A., Cherubini C., Filippi S., Pandolfi A., "Theoretical and Numerical Modeling of Nonlinear Electromechanics with applications to Biological Active Media", *Communications in Computational Physics* Volume 17 2015 Issue 1 Pages: 93-126
- 6) Nestola M.G.C., Gizzi A., Cherubini C., Filippi S., "Three-band decomposition analysis in multiscale FSI models of abdominal aortic aneurysms" *International Journal of Modern Physics C (Online Ready)* 2015, (doi: 10.1142/S0129183116500170)
- 7) Gizzi A., Ruiz-Baier R., Rossi S., Laadhari A., Cherubini C., Filippi S. "A three-dimensional continuum model of active contraction in single cardiomyocytes" *Modeling, Simulation and Applications* Volume 14, 2015, Pages 157-176.
- 8) Dupraz M., Filippi S., Gizzi A., Quarteroni A., Ruiz-Baier R., "Finite element and finite volume-element simulation of pseudo-ECGs and cardiac alternans", *Mathematical Methods in the Applied Sciences* (2015) Volume 38, Issue 6, 1 April 2015, Pages 1046-1058.

Wiltshire David L.

Position: Professor, Department of Physics & Astronomy,
University of Canterbury, Christchurch, New
Zealand

Period covered: 29 July 2008 – 30 October 2008



I Scientific Work

Inhomogeneous Cosmology, Backreaction, the Averaging Problem in General Relativity.

II Conferences and educational activities

II a Conferences and Other External Scientific Work, presented talks at:

- *New Zealand Institute of Physics 2015 Conference, Hamilton, NZ, 6-8 July, 2015*
- *ACGRG8: 8th Australasian Conference on General Relativity and Gravitation, Melbourne, Australia, 2-4 December, 2015*

II b Student supervision: Supervised 4 PhD students – *M Absan Nazer, Nezîbe Uzun, Cathy Neill, Yongzhuang Li* – and 2 MSc students: *Lawrence Dam, James McKay*.

II d Other Teaching Duties – Gave three lecture courses at University of Canterbury: *PHYS203 Quantum Physics; PHYS326 Classical Mechanics and Symmetry Principles; PHYS415 General Relativity*.

III. Service activities

III b. Outside ICRANet: ACGRG8 Organizing Committee; Editorial Board of *Classical and Quantum Gravity*; Academic Board at the University of Canterbury, Council of NZ Institute of Physics.

IV. Other activities

Presented seminars at *Institut d'Astrophysique de Paris, France, 7/4/2015; Université de Lyon 1, France, 10/7/2014*

Edited Special Focus Issue on “*Planck and the fundamentals of cosmology*” together with François Bouchet, *Classical and Quantum Gravity*, November 2015.

2015 List of Publications

- M.A. Nazer and D.L. Wiltshire, “*Cosmic microwave background anisotropies in the timescape cosmology*”, *Physical Review D* **91** (2015) 063519. [28 pp]
- N. Uzun and D.L. Wiltshire, “*Quasilocal energy and thermodynamic equilibrium conditions*”, *Classical and Quantum Gravity* **32** (2015) 165011. [24 pp]
- T. Buchert, M. Carfora, G.F.R. Ellis, E.W. Kolb, M.A.H. MacCallum, J.J. Ostrowski, S. Räsänen, B.F. Roukema, L. Andersson, A.A. Coley and D.L. Wiltshire, “*Is there proof that backreaction of inhomogeneities is irrelevant in cosmology?*”, *Classical and Quantum Gravity* **32** (2015) 215021. [38 pp]

Research Scientists

Cherubini Christian

Position: **University Researcher** (permanent) in
Theoretical Physics (FIS/02).

Integrated Center for Research (C.I.R.)
Engineering faculty,
University “Campus Bio-Medico”,
Via A. del Portillo 21, I-001285 Rome, Italy.

Period covered: November 1st 2007-today



I Scientific Work

- Astrophysics of self-gravitating fluids.
- General relativistic perturbation theory.
- Cosmology.
- Numerical Relativity.
- Fluid dynamics
- Theoretical biophysics.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

GNFM Meeting, October, 22-24, 2015, Montecatini (IT)

II b Work With Students

At the moment Dr Cherubini, together with Prof. S. Filippi is working with the IRAP PhD student Federico Cipolletta on numerical methods for rotating and self-gravitating classical and general relativistic fluid equilibrium configurations.

II c Diploma thesis supervision

II d Other Teaching Duties

- Lecturer “Electromagnetism” (Engineering Faculty, University Campus Bio-Medico of Rome).
- Lecturer “Mathematical Physics Models for Engineering” (Engineering Faculty, University Campus Bio-Medico of Rome).

II e. Work With Postdocs

At the moment Dr Cherubini is working with Dr Jorge Rueda on numerical relativity applied to rotating fluids.

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." by University of Rome "La Sapienza".

III b. Outside ICRANet

IV. Other

Dr Cherubini has a longstanding collaboration with other ICRANET scientists. In particular in collaboration with Dr Andrea Geralico, Dr Donato Bini, Prof. Robert T Jantzen and Prof. Remo Ruffini he has written plenty articles in various areas of General Relativity. With Prof. Simonetta Filippi he is involved in research activities in the fields of Stellar and Galactic Structures, Effective Geometries and Complex Systems in Nature.

2015 List of Publications

- 1) Cherubini C., Filippi S., Gizzi A. Loppini, A. "Role of topology in complex functional networks of beta Cells" Physical Review E, Volume 92, Issue 4, 5 October 2015, Article number 042702.
- 2) Cipolletta F., Cherubini C., Filippi S., Rueda J.A., Ruffini R. "Fast rotating neutron stars with realistic nuclear matter equation of state" Physical Review D - Particles, Fields, Gravitation and Cosmology Volume 92, Issue 2, 13 July 2015, Article number 023007.
- 3) Bertolaso M., Capolupo A., Cherubini C., Filippi S., Gizzi A., Loppini A, Vitiello G, "The role of coherence in emergent behavior of biological systems" Electromagnetic Biology and Medicine Volume 34, Issue 2, 1 June 2015, Pages 138-140.
- 4) Cherubini C., Filippi S., Gizzi A., Nestola M.G.C., "On the Wall Shear Stress Gradient in Fluid Dynamics" Communications in Computational Physics, Volume: 17, 2015 Issue: 3 Pages: 808-821
- 5) Gizzi A., Cherubini C., Filippi S., Pandolfi A., "Theoretical and Numerical Modeling of Nonlinear Electromechanics with applications to Biological Active Media", Communications in Computational Physics Volume 17 2015 Issue 1 Pages: 93-126
- 6) Nestola M.G.C., Gizzi A., Cherubini C., Filippi S., "Three-band decomposition analysis in multiscale FSI models of abdominal aortic aneurysms" International Journal of Modern Physics C (Online Ready) 2015, (doi: 10.1142/S0129183116500170)
- 7) Gizzi A., Ruiz-Baier R., Rossi S., Laadhari A., Cherubini C., Filippi S. "A three-dimensional continuum model of active contraction in single cardiomyocytes" Modeling, Simulation and Applications Volume 14, 2015, Pages 157-176.

Marco Muccino

Position: PhD

Period covered: 2010/2014

Position: Post-Doc

Period covered: 2014/2015



I. Scientific Work

My research area includes:

- data reduction of GRBs, from Swift-BAT and XRT, Fermi-GBM and LAT and BATSE by using XSPEC, RMFIT, and the Swift-BAT and XRT pipelines to create spectra and light curves;
- analysis and classification of short GRBs and quest of related progenitor systems as neutron star–neutron star (NS–NS) or NS–white dwarf (WD) mergers in the context of the Fireshell model;
- analysis and classification of long GRBs and application of the "Induced gravitational collapse" (IGC) model, proposed to explain the GRBs-supernovae (SNe) connection;
- analysis of the X-ray afterglow of long and short GRBs;
- analysis of the high energy spectral component of short and long GRBs;
- cosmology with GRBs.

II. Conferences and educational activities

II a. Conferences:

- 1) IRAP Ph.D. Erasmus Mundus Workshop “Recent News from the MeV, GeV and TeV Gamma-Ray Domains”, March 21st – 26th, 2011 Pescara (Italy)
- 2) IRAP Ph.D. Erasmus Mundus school, May 25th – June 10th, 2011 Nice (France)
- 3) HEPRO (High Energy Phenomena in Relativistic Outflows) III, June 27th – July 1st, 2011, Barcelona (Spain)
- 4) 12th Italian-Korean Symposium on Relativistic Astrophysics, July 4th – 8th, 2011 Pescara (Italy)
- 5) IRAP Ph Erasmus Mundus School, September 5th – 16th, 2011 Nice (France)
- 6) IRAP Ph.D. Erasmus Mundus Workshop, “Gamma Ray Bursts, their progenitors and the role of thermal emission”, October 2nd – 7th, 2011 Les Houches (France)
- 7) Third Galileo - Xu Guangqi meeting, “THE SUN, THE STARS, THE UNIVERSE and GENERAL RELATIVITY”, October 11th – 15th, 2011 Beijing (China)
- 8) 9th AGILE Science Workshop, Astrophysics with AGILE: Five Years of Surprises, April 16th – 17th, 2012 ESA-ESRIN, Frascati (Italy)
- 9) Thirteenth Marcel Grossmann Meeting (MG 13), “On Recent Developments on Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, July 1st – 7th, 2012

Stockholm (Sweden)

- 10) IRAP Ph.D. Erasmus Mundus School, September 3rd – 21st, 2012 Nice (France)
- 11) IRAP Ph.D. Erasmus Mundus School, May 16th – 31st, 2013 Nice (France).
- 12) 13th Italian-Korean Meeting on Relativistic Astrophysics, July 15th – 19th, 2013 Seoul (Korea).
- 13) IRAP Ph.D. Erasmus Mundus school, September 2nd – 20th, 2013 Nice (France).
- 14) XI International Conference on Gravitation, Astrophysics and Cosmology of Asia-Pacific Countries (ICGAC XI), October 1st – 5th, 2013 Almaty (Kazakhstan).
- 15) The 27th Texas Symposium on Relativistic Astrophysics, December 8th – 13th, 2013 Dallas (Texas, USA).
- 16) IRAP Ph.D. Erasmus Mundus School, February 23th – March 2nd, 2014 Nice (France).
- 17) Zeldovich-100 Meeting, “Subatomic particles, Nucleons, Atoms, Universe: Processes and Structure”, March 10th – 14th, 2014 Minsk (Belarus).
- 18) IRAP Ph.D. Erasmus Mundus Workshop, “Supernovae, Gamma-ray bursts and the induced gravitational collapse”, May 11th – 16th, 2014 Les Houches (France).
- 19) 1st Scientific ICRANet Meeting in Armenia, “Black Holes: the largest energy sources in the Universe”, June 30th – 4th July 2014 Yerevan (Armenia)
- 20) IRAP Ph.D. Erasmus Mundus school, September 8th – 19th, 2014 Nice (France).
- 21) The 2nd ICRANet Cesar Lattes Meeting, April 13th – 18th, 2015 Niteroi – Rio De Janeiro (Brazil).
- 22) Fourteenth Marcel Grossmann Meeting - MG14, July 12th – 18th, Rome (Italy).
- 23) 14th Italian-Korean Symposium on Relativistic Astrophysics", July 20th – 24th, Pescara (Italy)

II b. Work With Students:

Internal seminars and supervision of data analysis with PhD students.

III. Service activities

III a. Within ICRANet

- 1) Lecture: IRAP Ph.D. Erasmus Mundus School, September 5th - 16th, 2011 Nice (France)
“High Energy emission in GRBs: the case of GRB 090902B”
- 2) Lecture: IRAP Ph.D. Erasmus Mundus School, September 3rd - 21st, 2012 Nice (France)
“GRB090227B: the missing link between genuine short and long GRBs”
- 3) Lecture: IRAP Ph.D. Erasmus Mundus School, May 16th-31st, 2013 Nice (France) “GRB

090510: A Disguised Short Gamma-Ray Burst with the Highest Lorentz Factor and Circumburst Medium”

- 4) Lecture: IRAP Ph.D. Erasmus Mundus School, September 2nd–20th, 2013 Nice (France) “Data analysis of GRBs in the Fermi era”
- 5) Lecture: IRAP Ph.D. Erasmus Mundus Winter School, February 23th–March 2nd, 2014 Nice (France) “On the Binary Driven Hypernovae and their nested X-ray afterglows”
- 6) Lectures: IRAP Ph.D. Erasmus Mundus school, September 8th–19th, 2014 Nice (France)
 - a) “Generalities of GRBs and short GRBs in the fireshell model”,
 - b) “The binary-driven hypernovae”

III b. Outside ICRANet

December 2014. Set of lectures in Almaty (Kazakhstan) on GRBs for graduated and under-graduated students

IV. List of Publications, 2014 – 2015

- 1) “Evidence for a proto-black hole and a double astrophysical component in GRB 101023”, A&A, 538, A58 (2012). A.V. Penacchioni, R. Ruffini, L. Izzo, M. Muccino, C.L. Bianco, L. Caito, B. Patricelli, L. Amati.
- 2) “GRB 090227B: the missing link between the genuine short and disguised short GRBs”, ApJ, 763, 125 (2013); M. Muccino; R. Ruffini; C.L. Bianco; L. Izzo; A.V. Penacchioni.
- 3) “GRB 110709B in the induced gravitational collapse (IGC) paradigm”, A&A, 551, A133 (2013); A.V. Penacchioni, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, G.B. Pisani, J. A. Rueda.
- 4) “On a novel distance indicator for Gamma-Ray Bursts associated with Supernovae”, A&A, 52L, 5 (2013); G.B. Pisani, L. Izzo, R. Ruffini, C.L. Bianco, M. Muccino, A.V. Penacchioni, J. A. Rueda, Y. Wang.
- 5) “GRB 090510: A Disguised Short Gamma-Ray Burst with the Highest Lorentz Factor and Circumburst Medium”, ApJ, 772, 62 (2013); M. Muccino, R. Ruffini, C.L. Bianco, L. Izzo, A.V. Penacchioni, G.B. Pisani.
- 6) “On binary-driven hypernovae and their nested late X-ray emission”, A&A, 565, L10 (2014); R. Ruffini, M. Muccino, C. L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, A. V. Penacchioni, G. B. Pisani, J. A. Rueda, Y. Wang.
- 7) “Induced gravitational collapse at extreme cosmological distances: the case of GRB 090423”, A&A, 569, A39, (2014); R. Ruffini, L. Izzo, M. Muccino, G. B. Pisani, J. A. Rueda, Y. Wang, C. Barbarino, C. L.

Bianco, M. Enderli, M. Kovacevic.

- 8) “A search for Fermi bursts associated with supernovae and their frequency of occurrence”, *A&A*, 569, A108 (2014); M. Kovacevic, L. Izzo, Y. Wang, M. Muccino, M. Della Valle, L. Amati, C. Barbarino, M. Enderli, G. B. Pisani, L. Li.
- 9) “GRB 130427A and SN 2013cq: A Multi-wavelength Analysis of An Induced Gravitational Collapse Event”, *ApJ*, 798, 10 (2015); R. Ruffini, Y. Wang, M. Kovacevic, C. L. Bianco, M. Enderli, M. Muccino, A. V. Penacchioni, G. B. Pisani, J. A. Rueda.
- 10) “Extracting multipole moments of neutron stars from quasi-periodic oscillations in low mass X-ray binaries”, *Astronomy Reports*, 59, 441 (2015); K. Boshkayev, J.A. Rueda, M. Muccino.
- 11) “On binary driven hypernovae and their nested late X-ray emission”, *Astronomy Reports*, 59, 581 (2015); M. Muccino, R. Ruffini, C. L. Bianco, M. Enderli, M. Kovacevic, L. Izzo, A. V. Penacchioni, G. B. Pisani, J. A. Rueda, Y. Wang.
- 12) “Induced gravitational collapse in the BATSE era: The case of GRB 970828”, *Astronomy Reports*, 59, 626 (2015); R. Ruffini, L. Izzo, C. L. Bianco, J. A. Rueda, C. Barbarino, H. Dereli, M. Enderli, M. Muccino, A. V. Penacchioni, G. B. Pisani, Y. Wang.
- 13) “Predicting supernova associated to gamma-ray burst 130427a”, *Astronomy Reports*, 59, 667 (2015); Y. Wang, R. Ruffini, K. Kovacevic, C. L. Bianco, M. Enderli, M. Muccino, A. V. Penacchioni, G. B. Pisani, J. A. Rueda.
- 14) “GRB 140619B: a short GRB from a binary neutron star merger leading to black hole formation”, *ApJ*, 808, 190 (2015); R. Ruffini, M. Muccino, M. Kovacevic, F. G. Oliveira, J. A. Rueda, C. L. Bianco, M. Enderli, A. V. Penacchioni, G. B. Pisani, Y. Wang, E. Zaninoni.
- 15) “New measurements of Ω_m from gamma-ray bursts”, *A&A*, 582, A115 (2015); L. Izzo, M. Muccino, E. Zaninoni, L. Amati, M. Della Valle.

Visiting Scientists

Abishev Medeu

Position: head of al-Farabi Kazakh national university's theoretical and nuclear physics department

Period covered: 7.07.2012-29.07.2012, 9.07.2015-9.08.2015



I Scientific Work

Research on GR and astrophysics

II Conferences and educational activities

II a Conferences and Other External Scientific Work

ICGAC-11, XIth International Conference on Gravitation, Astrophysics and Cosmology Al Farabi Kazakh National University in Almaty, Kazakhstan, October 1-5, 2013.

II b Work With Student

Toktarbay Saken, Yerlan Aimuratov, Bakytzhan Zhamy, Manas Hasanov, Nurzat Kenzhebayev, Meruert Takibayeva

II c Diploma thesis supervision

Toktarbay Saken, Yerlan Aimuratov, Bakytzhan Zhamy, Manas Hasanov, Nurzat Kenzhebayev

II d Other Teaching Duties

Special courses for master students: GR mechanics, Mathematical methods of theoretical physics

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

Head of GRG laboratory in Institute of experimental and theoretical physics, Almaty

IV. Other

2015 List of Publication

M. E. Abishev, S. Toktarbay, and B. A. Zhami. On the Stability of Circular Orbits of a Test Body in the Restricted Three-Body Problem in GR Mechanics. Gravitation and Cosmology, 2014, Vol. 20, No. 3, pp. 149–151.

Abishev, ME; Boshkayev, KA; Dzhunushaliev, VD; Ivashchuk, VD. Dilatonic dyon black hole solutions. CLASSICAL AND QUANTUM GRAVITY, Volume: 32, Issue: 16

Abishev, M; Aimuratov, Y; Aldabergenov, Y; Beissen, N; Bakytzhan, Takibayeva, M. Some astrophysical effects of nonlinear vacuum electrodynamics in the magnetosphere of a pulsar. ASTROPARTICLE PHYSICS, Volume: 73, Pages: 8-13

Ahmedov Bobomurat

Position: Principal Researcher/Professor/
HEAD, THEORETICAL ASTROPHYSICS
GROUP (supported through PRJ-29, AS-ICTP)
Institute of Nuclear Physics
Uzbekistan Academy of Sciences
Ulughbek, Tashkent 100214
UZBEKISTAN
Period covered: from year 1996



I Scientific Work

My present employment and duties:

My main duty is to carry out the theoretical research in the relativistic astrophysics of the compact objects, electrodynamics of continuous media in general relativity and observational research on GPS and VLF data analysis for ionospheric disturbances caused by various atmospheric, terrestrial and extraterrestrial phenomena. At present I am holding a position of Projects Leader and Head of Sector of Theoretical Astrophysics (partly supported by the AS-ICTP through PRJ-29 project) in the Institute of Nuclear Physics, position of Principal Researcher and Projects Leader (part time) at the Ulugh Beg Astronomical Institute in Tashkent. I am coordinator of the AS-ICTP Network on Relativity, Astrophysics and Cosmology between India, Thailand and Uzbekistan (ITUN). I am a member of Scientific Councils at the Ulugh Beg Astronomical Institute and at the Institute of Nuclear Physics, Tashkent; and of Expert Group on Physics and Mathematics of the Supreme Attestation Committee under the Cabinet of Ministers of the Republic of Uzbekistan.

My research is mainly devoted to 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 my scientific interests. In addition I do 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 2015

RAGtime 17, Silesian university in Opava, Czech Republic, **01 – 05 November, 2015**

The 14th MG XIV MARCEL GROSSMANN MEETING, **ROME - 12-18 JULY, 2015**

II b. Work With PhD Students

Sanjar Shaymatov, PhD student, General relativistic astrophysical processes in the vicinity of compact gravitational objects in the presence of an electromagnetic field

Abdullo Hakimov, PhD student, Relativistic Astrophysical Processes in Axial Symmetric Alternative Gravitational Models

Ozodbek Rahimov, PhD student, Particle Motion and Electromagnetic Fields around Axial Symmetric Gravitating Objects

II c. Diploma thesis supervision

II d. Other Teaching Duties

Fall term 2015: 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.

II e. Work With Postdocs

With Dr. **Ahmadjon Abdujabbarov**, PhD, starting 2009 on project “General Relativistic Astrophysical Processes in Vicinity of Axial Symmetric Compact Objects in Presence of Magnetic Field”

Partial work with Dr. **Viktoriya Giryanskaya (Morozova)**, PhD, starting 2010 on project “Problems of Relativistic Astrophysics of Magnetized Compact Objects”

III Service activities

Within ICRANet

Outside ICRANet

Details of projects led in year 2015

UNESCO-TWAS Regular Associate (Trieste, Italy) at the TIFR (Mumbai, India), 2012-2015

Leader of 5 Years Research Project "*Gravitational and Electromagnetic Processes in Relativistic Astrophysics and Cosmology*" from the Uzbekistan Academy of Sciences, **Grant F2-FA-F113**, Tashkent, Uzbekistan (**1 January 2012 - 31 December 2016**).

Co-Leader of 5 Years Research Project "*Physics of Gravitational Lenses, Compact Astrophysical Objects and Nonstationary Disc Systems*" from the Uzbekistan Academy of Sciences, **Grant F2-FA-F029**, Tashkent, Uzbekistan (**1 January 2012 - 31 December 2016**).

Member of Expert Group on Physics and Mathematics of the Supreme Attestation Committee under the Cabinet of Ministers of the Republic of Uzbekistan (starting **January 2014 up to now**).

IV Other

2015 List of Publications

1. Sanjar Shaymatov, Mandar Patil, **Bobomurat Ahmedov**, and Pankaj S. Joshi., Destroying a near-extremal Kerr black hole with a charged particle: Can a test magnetic field serve as a cosmic censor?//**Physical Review D**, 2015, Vol. 91, 064025, 11pp.
2. B. Toshmatov, A. Abdujabbarov, Z. Stuchlik, **B. Ahmedov**, Quasinormal modes of regular black holes // **Physical Review D**, 2015, V. 91, id. 064004.
3. Atamurotov F.S., Ahmedov B.J., Abdujabbarov A.A., Optical properties of black holes in the presence of a plasma: The shadow, **Physical Review D**, 2015, Volume 92, id 084005.
4. A. A. Abdujabbarov, L. Rezzolla and **B. J. Ahmedov**, A coordinate-independent characterization of a black-hole shadow, **Mon. R. Astron. Soc.**, 2015, **V. 454**, 2423–2435.
5. Abdujabbarov A.A., Atamurotov F.S., Dadhich N.K., **Ahmedov B.J.**, Stuchlik Z., Energetics and optical properties of 6-dimensional rotating black hole in pure Gauss-Bonnet gravity, **Eur. Phys. J. C**, 2015, Volume 75, id. 399.
6. J.R. Rayimbaev, **B.J. Ahmedov**, N.B. Juraeva, A.S. Rakhmatov, Plasma magnetosphere of deformed magnetized neutron star // **Astrophys Space Sci**, 2015, Vol. 356, pp.301–308.
7. Toshmatov, Bobir; Abdujabbarov, Ahmadjon; **Ahmedov, Bobomurat**; Stuchlik, Zdenek, Particle motion and Penrose processes around rotating regular black hole // **Astrophys Space Sci**, 2015, V. 357, P. 220-235.
8. Toshmatov, Bobir; Abdujabbarov, Ahmadjon; **Ahmedov, Bobomurat**; Stuchlik, Zdenek, High Energy Collisions of Magnetized Particles around a Horava-Lifshitz Black Hole // **Astrophys Space Sci**, 2015, V. 360, Issue 1, id.19, DOI 10.1007/s10509-015-2533-y, 10pp.

Batebi Saghar

University: Isfahan University of Technology, Iran.

Position: Visiting researcher

Period covered: 12/2014-5/2015



I Scientific Work:

The investigation of Higgs boson production and decay channel in NonCommutative space-time.

Study of CMB polarization in NonCommutative space-time.

Study of the GRB circular polarization.

Interaction of high energy photons with the background radiation in the universe.

III. Service activities

Islamic Azad University, teaching Fundamantal Physics, Electricity and magnetic physics and related Labs.

2015 List of Posters

S. Batebi; S. Tizchang; R.Mohammadi; R. Ruffini; S. S. xue 'The generation of circular polarization of GRB, MG14.

S.Tizchang, S.Batebi, R. Mohammadi, R. Ruffini , G. Vereshchagin, S.-S. Xue, Interaction of high energy photons with the background radiation in the universe, MG14.

2015 List of Publication

S. Batebi, M. Haghighat, S. Tizchang, H. Akafzadeh, Higgs Couplings in NonCommutative Standard Model, International journal of modern physics A, vol 3, number 20 (2015).

Hoang Ngoc Long

Position: Head of Particle Physics section,
Graduate School, Institute of Physics

Vietnamese Academy of Science and Technology

Period covered: From 2000 --- now



I. Scientific Work (6 papers)

1. On the connection of $g-2_{\mu}$, electroweak, dark matter and collider constraints on 331 models, Chris Kelso, **H. N. Long**, R. Martinez, Farinaldo S. Queiroz, *Phys. Rev. D* **90**, 113011 (2014) (13 pages)
2. Neutrino mixing with non-zero θ_{13} and CP violation in the 3-3-1 model based on S_4 flavor symmetry, Vo Van Vien, **Hoang Ngoc Long**, Dinh Phan Khoi, *Int. J. Mod. Phys. A* **30** (2015) No. 17, 1550102 (24 pages),
3. Quark mass and mixing in the 3-3-1 model with neutral leptons based on D_4 flavor symmetry, V. V. Vien and **H. N. Long**, *Journal of the Korean Physical Society* (JKPS) **66**, No 12, pp. 1805-1815 (2015)
4. Neutrino mixing with non-zero θ_{13} and CP violation in the 3-3-1 model based on A_4 flavor symmetry, Vo Van Vien and **Hoang Ngoc Long** *Int. J. Mod. Phys. A* **30** (2015), No. 21, 1550117 (32 pages)
5. Electroweak phase transition in the economical 3-3-1 model, Vo Quoc Phong, **Hoang Ngoc Long**, Vo Thanh Van, Le Hoang Minh, *Eur. Phys. J. C* **75**, (2015) 342 (13 pages).
6. The muon anomalous magnetic moment in the supersymmetric economical 3-3-1 model, D. T. Binh, D. T. Huong, **H. N. Long**, *Zh. Eksp. Teor. Fiz.* **148**, No. 6, (2015) pp. 1115 – 1120

II. Conferences and educational activities

II a. Conferences and Other External Scientific Works:

- *Editor of journal of Vietnam: **Communications in Physics.***

II b. Work With Students: I give lectures on Quantum Field Theory for Undergraduate students, Hanoi University of Education, Standard Model for Graduate students, Can Tho University

II c. Diploma thesis supervision: I am supervisor for 5 Ph. D. students and 6 Master Students.

II d. Other Teaching Duties: I am a referee for some Ph. D. Theses.

II e. Work With Postdocs: Now I work with Postdoc: D. T. Huong and L. T. Hue

III. Service activities

III a. Within ICRANet: I hope to visit ICRANET next year 2016

III b. Outside ICRANet:

IV. Other I am referee for some International Journal such as: Phys. Rev. D, Int. J. Mod. Phys. A,...

Perez Martinez Aurora Maria

Position: Senior Researcher/Senior Professor
Period covered: 2015



I Scientific Work

- Study of the problem of structure equations for magnetized compact objects: strange stars and white dwarfs.
- Study of the cosmological evolution of primordial magnetic fields.
- Study of the dispersion relation of photons in a magnetized medium and their astrophysical implications.
- Study of Constraints braneworld from compact stars.

II Conferences and educational activities 2015

2015 NURT February 9-13 February Havana. Work presented: Quantum Faraday Effect in 3D+1 and 2D+1 dimensions: a QED approach.

2015 Stars 2015, and SMFNS2015 10-16 May work presented: Magnetized Quark Stars and anisotropic stellar structure.

2015 14 th Marcel Grossmann Meeting, 12-18 July Rome, Italy. work presented: Magnetized stars and anisotropic stellar structure equations.

2015 14th Italian-Korean Symposium on Relativistic Astrophysics, 20-24 July, Pescara Italy. Work presented: Magnetic fields and compact objects.

II b Work With Students.

PhD students

-Supervision of the PhD thesis of Daryel Manreza Paret from Havana University, the title of the thesis “Efectos del campo magnetico en las ecuaciones de estado y de estructura de objetos compactos” Faculty of Physics, Havana University, Discussion January 20th 2015

II c Diploma thesis supervision

-Diploma thesis of Diana Alvear Terrero, entitled “Enanas Blancas Magnetizadas”, Faculty of Physics, Havana University discussion December 2th 2015

II d Other Teaching Duties

Theaching postgraduate course of Topics of Astrophysics. Faculty of Physics Havana University – ICIMAF, 2015-2016.

II e. Work With Postdocs

Work in collaboration with D. Manreza Paret in topics related to:

- Anisotropic structure equations for magnetized compact objects.
- Constraints braneworld parameters from compact stars models

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...)*]

II a. Within ICRANet

1. Discussion of topics of common interest with Jorge Rueda for the beginning of a work in collaboration: A) Dispersion relation of the photon in a magnetized medium. Applications to Neutron stars.
2. Discussion with Kuantay Boshkayev about rotating White Dwarfs

3. III b. Outside ICRANet

Collaboration:

- 1) Collaboration with Gabriella Piccinelli from FES Aragon UNAM, R. Sussman from ICN-UNAM, and Ismael Delgado from IGA from Havana in the field: Magnetic field and cosmological evolution.
- 2) Collaboration with EJ Ferrer, V de la Incera from Universidad de Texas at El Paso, USA and Angel Sanchez from Facultad de Ciencias UNAM. More realistic EoS of magnetized dense matter: rol of Anomalous Magnetic Moment (AMM)
- 3) Collaboration with Jorge Horvath from IAG USP Sao Paulo Brazil. Anisotropic stellar structure equations for magnetized stars.
- 4) Collaboration with R. González Felipe from CFTP, Instituto Superior Tecnico de Lisboa. Constraints braneworld from compact stars.

IV. Other

Member of IAC Marcel Grossman Meeting (MG14) Rome, July 2015.

Organization in collaboration with Prof Cesar Vasconcellos of International conferences: stars2015/smfns2015 May 2015

Awards

Award of Theoretical Physics of Cuban Academy of Science (2014).

2015 List of Publication

1. Insignificance of the Anomalous Magnetic Moment of Charged Fermions for the Equation of State of a Magnetized and Dense Medium E J Ferrer, V de la Incera, D. Manreza, A. Pérez Martínez and A. Sanchez Phys Rev D 91, 085041 p 1-23 <http://dx.doi.org/10.1103/PhysRevD.91.085041>
2. Maximum mass of magnetic white dwarfs D. Manreza Paret, J. E Horvath, A. Perez Martinez arXiv:1501.04619 RAA 2015 Vol. **15** No. **10**, 1735–1741 doi: 10.1088/1674-4527/15/10/01
3. Anisotropic stellar structure equations for magnetized strange stars Daryel Manreza Paret, Jorge Ernesto Horvath and Aurora Pérez Martínez **RAA 2015** Vol. **15** No. **7**, 975–985 doi: 10.1088/1674-4527/15/7/005
4. Early Universe evolution in presence of magnetic fields Delgado Gaspar, A. Perez Martinez, G. Piccinelli, Roberto A. Sussman, Astron. Nachr. /AN 336, No. 8/9, 800 – 804 (2015) / DOI 10.1002/asna.201512219
5. Anisotropic stellar structure equations for magnetized stars. D. Manreza Paret, J. E Horvath, A. Perez Martinez. Astron.Nachr. /AN **336**, No.8/9, 856 – 860 (2015) / DOI 10.1002/asna.201512237
6. On the instability of the SM for magnetic fields larger than M^2 . A Cabo Montes de Oca, D. Manreza Paret, A. Perez Martinez, E. Rodriguez Querts, G. Piccinelli, Astron.Nachr. /AN 336, No. 8/9, 845 – 850 (2015) /DOI 10.1002/asna.201512235
7. Magnetic field effects on the mass-radius relation of white dwarfs D. Alvear Terrero, M. Castillo Garcia, D. Manreza Paret, J.E. Horvath, A. Perez Martinez, Astron.Nachr. /AN **336**, No. 8/9, 851–855 (2015) / DOI 10.1002/asna.201512236
8. Propagation of photons in a diluted medium, Faraday Effect L. Cruz Rodriguez, A. Perez Martinez, H. Perez Rojas, E. Rodriguez Querts Astron.Nachr. /AN **336**, No. 8/9, 895–899 (2015) / DOI 10.1002/asna.201512245

Submitted papers:

1. A non-perturbative study of the evolution of cosmic magnetised sources. I. Delgado Gaspar, A Perez Martinez, G. Piccinelli and Roberto A Sussman arXiv:1504.06892 submitted to Class Quantum Gravity 2015

Raffaelli Bernard

Position: Visiting Assistant Professor at ESME
Lyon (*école d'ingénieurs*), France.

Period covered: from September 2015

Before: Postdoctoral researcher at Yukawa
Institute for Theoretical Physics, Kyoto, Japan



Scientific Work

Research interests:

Gravitation, Black Holes Physics, Quantum Field Theory, Quantum Gravity, Cosmology and Foundations of Physics.

My recent works are focused on:

- AdS/CFT correspondance: CFT2 interpretation of the BTZ black hole Regge Modes
- Semi-classical strong gravitational lensing
- Quantum Field Theory on curved spacetime and the role of the quantum vacuum in the accelerated expansion of the Universe, in the framework of Hadamard renormalization.
- Quantum understanding of inertia, matter, spacetime and gravitation, through 2-spinors formalism and the $SL(2, \mathbb{C})$ formulation of General Relativity.

Service activities

Outside ICRANet

- Teaching activities at ESME Lyon: Mechanics, Electricity, Electromagnetism, Thermodynamics to 1st and 2nd years students
- Administrative activities: curriculum development, assessment.

2015 List of Publication

December 2014: *"Strong gravitational lensing and black hole quasinormal modes: towards a semiclassical unified description"* B. Raffaelli, submitted to General Relativity and Gravitation, still in review.

Tizchang Seddigheh

Position: PhD Student

Present institute: Dep. Of Physics, Isfahan University
Of Technology, Isfahan, Iran

Period covered: 2012 -present



I Scientific Work:

I am working on: phenomenology of SM bosons in NonCommutative space- time.

In ICRANet I worked on: Circular polarization and opacity of high energy photon such as GRB in presence of background cosmic ray.

II Conferences and educational activities

II a Conferences and Other External Scientific Work outside ICRANet

A few national conferences held in Iran.

III. Service activities

IIIa. Inside ICRANet

Collaboration with ICRANet as visitor, November 2014- May 2015, Pescara, Italy.

III b. Outside ICRANet

Instructing a few Physics Courses in one of the universities in Iran .

IV. Other

We presented our work in MG14 as two posters.

- I. Interaction of High Energy photons with the background radiation in the universe.
- II. The generation of circular polarization of Gamma Ray Bursts.

(2015) List of Publication

- S. Batebi, M. Haghighat, S. Tizchang, H. Akafzadeh, *Higgs Couplings in NonCommutative Standard Model*, Int. J. Mod. Phys. A **30**, 1550108 (2015).
- Interaction of High Energy photons with the background radiation in the universe (in progress).
- The generation of circular polarization of Gamma Ray Bursts (in progress).

International Relativistic Astrophysics Ph. D.

Lecian Orchidea Maria

Postdoctoral Research
2015

I Scientific Work

General Relativity, Cosmology

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Quantum Gravity Meeting Rome 2015

Sapienza University, Rome, Italy, 20-23 July 2015

Contribution: Deformations of the Hamiltonian Constraint in General Relativity

III. Service activities

III a. Within ICRANet

Fourteenth Marcel Grossmann Meeting- MG14

Sapienza University, Rome, Italy, July 12-18, 2015

Contribution: The Hamiltonian constraint and its possible deformations (co-authors: Giovanni Amelino Camelia, Lorenzo Cesarini)

Contribution: An analysis of the symmetries of cosmological billiards

IV. Other

Focus Program on 100 Years of General Relativity

Singularities in General Relativity June 15-18, 2015

The Fields Institute for Research in Mathematical Sciences, Toronto, Canada

2015 List of Publication

O.M. Lecian: Cosmological-Billiards Groups and self-adjoint BKL Transfer Operators, author revision for publication on JHEP (Journal of High-Energy Physics)

Position: Professor

Period covered: November 2014/ November 2015



I Scientific Work

In three fields: education, light curves of novae (photometry in Visual band), solar metrology.

Selection of Relativistic themes presented to high school students in the context of IYL2015 simplification of the language and of the mathematical load.

Measure in V band with 20 cm Telescope Schmidt-Cassegrain of Novae of SGR 2015 no. 2, 3, 4; participation to AAVSO observational campaigns and HST Science Institute preparational campaigns, with preliminary results on <http://www.astronomerstelegam.org/?read=8275>

Photometry of PHEMU 2015 with Io and Europa satellites of Jupiter.

Instrumental study to understand the anomaly of the measures of the solar diameter with the heliometer of Rio de Janeiro National Observatory focusing on the glass filter used.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

International Year of Light 2015 two public conferences June 21 and September 23. Public observations of the eclipse and of the spring equinox on March 20.

Link

<http://www.light2015.org/Home/Event-Programme/2015/Conference/Italy-Sunlight--Celestial-and-Magnetic-North-on-the-Meridian-Line.html>

<http://www.light2015.org/Home/Event-Programme/2015/Conference/Italy-Timing-the-fall-equinox.html>

International congress on Gerbert of Aurillac, scientist and Pope of year 1000, focused on Music theory for 2015 edition in Sapienza University.

Link

www.icra.it/gerbertus

Conferences in Cosmology and Fundamental Physics at University Regina Apostolorum:

link

http://www.uprait.org/index.php?option=com_eventlist&view=details&id=410&lang=en

101st Congress of Italian Physical Society, Rome Sapienza University September 2015

Marcel Grossmann Meeting XIV, Rome Sapienza University July 2015

II b Work With Students

Alessio Mimmo and Massimo Carinci Physics graduated students at the Sapienza University on experimental solar metrology, with Astrophysics' chair Paolo De Bernardis

II c Diploma thesis supervision

Diploma thesis: in University Regina Apostolorum diploma Master in Science and Faith, topics on History of Astronomy and Cosmology.

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

Notte Europea dei Ricercatori on the observations of Novae in 2015 and on the measurements of the solar diameter. 25 september 2015

III b. Outside ICRANet

Full professorship at IIS Federico Caffè High School in Rome on Physics and Laboratory with 160 students

IV. Other

2015 List of Publication

1) Astrometry and numerical methods for the solar heliometer at Observatorio Nacional in Brasil Andrei, A.; Boscardin, S.; Penna, J.; Sigismondi, C.; Reis Neto, E.; d'Avila, V. Proceedings of the Journées 2014 "Systèmes de référence spatio-temporels":Recent developments prospects in ground-

- based and space astrometry, held at Pulkovo Observatory from 22 to 24 September 2014, Z. Malkin & N. Capitaine (eds.), ISBN 978-5-9651-0873-2 & ISBN 978-2-901057-70-3, p. 248-249
Bibliographic Code: 2015jsrs.conf..248A
- 2) Measures of the Earth obliquity during the 1701 winter solstice at the Clementine meridian line in Rome,
Andrei, A.; Sigismondi, C.; Regoli, V., Proceedings of the Journées 2014 "Systèmes de référence spatio-temporels": Recent developments prospects in ground-based and space astrometry, held at Pulkovo Observatory from 22 to 24 September 2014, Z. Malkin & N. Capitaine (eds.), ISBN 978-5-9651-0873-2 & ISBN 978-2-901057-70-3, p. 116-117
Bibliographic Code: 2015jsrs.conf..116A
- 3) 6 Years After the Inauguration of the Heliometer at Observatório Nacional
Humberto Andrei, Alexandre; Amorim D'Avila, Victor; Reis Neto, Eugenio; Lousada Penna, Jucira; Calderari Boscardin, Sergio; Sigismondi, Costantino, IAU General Assembly, Meeting #29, #2243377
Bibliographic Code: 2015IAUGA..2243377H
- 4) Analysis of the Solar Diameter Variations at July, 1986 and the Geomagnetic Storm of March, 1989
Humberto Andrei, Alexandre; Garcia, Marcos A.; Papa, Andres R. R.; Calderari Boscardin, Sergio; Lousada Penna, Jucira; Sigismondi, Costantino, IAU General Assembly, Meeting #29, #2235993
Bibliographic Code: 2015IAUGA..2235993H
- 5) The Eddington's Eclipse and a Possible Replica of the Experiment of Light Bending
Sigismondi, Costantino eprint arXiv:1507.03879
Bibliographic Code: 2015arXiv150703879S
- 6) Optical Deformations in Solar Glass Filters for High Precision Astrometry
Sigismondi, Costantino; Humberto Andrei, Alexandre; Calderari Boscardin, Sérgio; Lousada Penna, Jucira; Reis-Neto, Eugênio eprint arXiv:1507.03636
Bibliographic Code: 2015arXiv150703636S
- 7) Transits of Venus and Solar diameter measures from ground: method and results from Athens (2004) and Huairou (2012), Sigismondi, Costantino; Ayiomamitis, Anthony; Wang, Xiaofan; Xie, Wenbin; Carinci, Massimo; Mimmo, Alessio eprint arXiv:1507.03622
Bibliographic Code: 2015arXiv150703622S
- 8) Observational Accuracy of Variable Stars, Novae and Supernovae from Naked Eye to General Relativistic Standard: a Balance over Thousand SGQ Observations Sent to AAVSO, Sigismondi, Costantino eprint arXiv:1506.03770
Bibliographic Code: 2015arXiv150603770S
- 9) Declinazione magnetica: storia delle prime misure e misura con l'azimut del Sole
Sigismondi, Costantino
Gerbertus, Vol. 9, p. 1-8, 2015
Bibliographic Code: 2015Gerbertus....9....1S
- 10) Stelle e pianeti artificiali per esperimenti di ottica ondulatoria al telescopio
Sigismondi, Costantino
Gerbertus, Vol. 8, p. 91-94, 2015
Bibliographic Code: 2015Gerbertus....8...91S
- 11) Gerbertian paths for the Jubilee
Sigismondi, Costantino
Gerbertus, Vol. 8, p. 83-90, 2015
Bibliographic Code: 2015Gerbertus....8...83S
- 12) Problemi e di Fisica e Astronomia ed il metodo di Gerberto docente, Sigismondi, Costantino

Gerbertus, Vol. 8, p. 39-64, 2015

Bibliographic Code: 2015Gerb....8...39S

13) Venus Transits: History and Opportunities for Planetary, Solar and Gravitational Physics

Sigismondi, C.; Wang, X.; Rocher, P.; Reis Neto, E., The Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories - Proceedings of the MG13 Meeting on General Relativity (in 3 Volumes). Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN #9789814623995, pp. 2369-2371 DOI: 10.1142/9789814623995_0443

Bibliographic Code: 2015mgm..conf.2369S

14) Transits of Venus and the Astronomical Unit: Four Centuries of Increasing Precision, Sigismondi, C.

pp. 2064-2066

DOI: 10.1142/9789814623995_0358

Bibliographic Code: 2015mgm..conf.2064S

15) Tower bells and time zones, a history of ynschronization, Sigismondi, Costantino, eprint arXiv:1412.8661

ArteScienza, Online Journal, num. 2, pag. 129-137 (2014)

Bibliographic Code: 2014arXiv1412.8661S

16) Measures of the Earth Obliquity during the 1701 Winter Solstice at the Clementine Meridian Line in Rome, Humberto Andrei, Alexandre; Sigismondi, Costantino; Regoli, Veronica, eprint arXiv:1412.6096

Bibliographic Code: 2014arXiv1412.6096H

17) PHEMU congress 2015

Visual observations of mutual eclipses of Galileian satellites with small telescopes under city lights
Costantino Sigismondi, proc. Of the congress, Paris 14-18 October 2015

18) The 2016 transit of Mercury and the solar diameter measurement, Solar metrology congress Royal Observatory of Belgium, 21 September 2015

<ftp://ftp.latmos.ipsl.fr/outgoing/MEFTAH/>

19) La Luna piena nel Presepio http://www.assculturale-arte-scienza.it/Rivista%20ArteScienza/ArteScienza_N2/Costantino%20Sigismondi/Sigismondi-La%20Luna%20piena%20nel%20presepio.html ArteScienza, Online Journal, num. 2, pag. 138 (2014)

Boshkayev Kuantay



Position: Research associate

Period covered: 1 July-27 August 2015

I Scientific Work

- Rotating white dwarfs and neutron stars in general relativity
- Geodesics in the field of rotating and deformed objects
- Quasi-periodic oscillations from X-ray sources
- White dwarf model of magnetars
- Approximate and exact solutions of Einstein equations.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

1. 9th Alexander Friedmann International Seminar on Gravitation and Cosmology and 3rd Satellite Symposium on the Casimir Effect. St. Petersburg, Russia, June 21 – 27, 2015
2. 9th APCTP-BLTP JINR Joint Workshop on Modern Problems of Nuclear and Elementary Particle Physics, Almaty, Kazakhstan, June 27-July 4, 2015.
3. 14th Marcel Grossmann Meeting on Recent Developments in Theoretical and Experimental General Relativity, Gravitation, and Relativistic Field Theory, University of Rome Sapienza July 12 - 18, 2015, Rome, Italy.
4. 14th Italian-Korean Symposium on Relativistic Astrophysics July 20-24, 2015 ICRANet, Pescara, Italy.

II b Work With Students

Collaboration with Yerlan Aimuratov

II e. Work With Postdocs

Collaboration with Marco Muccino, Camargo Rodrigues de Lima Rafael, Ivan Siutsou and Riccardo Belvedere

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

Scientific collaboration with prof. Remo Ruffini and Dr. Jorge Rueda

III b. Outside ICRANet

Teaching activity at the faculty of physics and technology of al-Farabi Kazakh National University (KazNU), Almaty, Kazakhstan.

2015 List of Publication

1. Boshkayev K., Rueda J., Muccino M. Extracting Multipole Moments of Neutron Stars from Quasi-Periodic Oscillations in Low Mass X-Ray Binaries // Astronomy Reports. – 2015. – Vol. 59. – No. 6. – P. 441–446.

2. Abishev M. E., Boshkayev K. A., Dzhunushaliev V. D., Ivashchuk V. D. Dilatonic dyon black hole solutions // *Classical and Quantum Gravity*, Volume 32, Issue 16, article id. 165010 (2015).
3. Boshkayev K., Rueda J., Ruffini R., Siutsou I. General Relativistic and Newtonian White Dwarfs // *Proceedings of the MG13 Meeting on General Relativity*. Edited by Rosquist K. et al. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN 9789814623995, pp. 2468-2474.
4. Boshkayev K., Rueda J., Ruffini R. SGRs and AXPs as Massive Fast Rotating Highly Magnetized White Dwarfs: the Case of SGR 0418+5729 // *Proceedings of the MG13 Meeting on General Relativity*. Edited by Rosquist Kjell et al. Published by World Scientific Publishing Co. Pte. Ltd. – 2015. – ISBN 9789814623995 – P. 2295-2300.

Benetti Micol

Position: Post- doctoral in the National
Observatory of Rio de Janeiro
Period covered: 15/8/2014 - now



I Scientific Work

In the past year I started to work in the National Observatory of Rio de Janeiro. I was principally interested in implement the galaxy data (e.g the SDSS - data release 11) in the Cosmomc code, in order to use them in cosmology analyses. I also continue my Phd topic on constraining inflationary models, starting collaborations with the Prof. Rudnei Ramos (UERJ - Universidade do Estado do Rio de Janeiro) and the Prof. Susana Landau (IFIBA-Instituto de Física de Buenos Aires). I was also involved in two collaboration. First, with G. C. Carvalho, on the Baryon Acoustic Oscillations analysis; we submitted the work in PRD journal. Then, with C. Novaes, on primordial Non-Gaussianities signal; we submitted the work in JCAP journal. Finally, I participated at several conference, presenting our results.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Presented talk in XIVth Marcel Grossmann Meeting - International meeting, July 12-18 2015, Rome, Italy

Presented talk in Meeting on Fundamental Cosmology - International meeting, June 17-19 2015, Santander, Spain

Presented talk in VIth Workshop Challenges Of New Physics In Space - International meeting, May 24-29 2015, Campos do Jordao, SP, Brazil

Presented talk in 2nd Cesar Lattes Meeting - International ICRAnet meeting, Apr 13-18 2015, Rio de Janeiro, RJ, Brazil

Presented talk in 10th J-PAS Collaboration Meeting - International J-PAS meeting, Feb 9-13 2015, Paraty, RJ, Brazil

Participating in School of Theory of cosmological perturbations - Ph.D School, Nov 12-14 2014, Rio de Janeiro, RJ, Brazil

Participating in XIXth Cycle of Special Courses (CCE) - Ph.D School, Nov 3-7 2014, Rio de Janeiro, RJ, Brazil

Presented talk in Theory Miniworkshop J-PAS collaboration - National J-PAS meeting, Oct 15 2014, Rio de Janeiro, RJ, Brazil

Participating in Ist School of Statistical Methods in Physics - Ph.D School, Oct 6-10 2014, Goiania, GO, Brazil

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

Lesson for graduates in the cycle courses “Escola de inverno 2015”. Location: Observatorio Nacional.
Topic: The Early Universe.

Mini course for PhD and Post-PhD. Location: Observatorio Nacional. Topic: The CAMB code.

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

Presented talk in XIVth Marcel Grossmann Meeting - International meeting, July 12-18 2015, Rome, Italy

Presented talk in 2nd Cesar Lattes Meeting - International ICRANet meeting, Apr 13-18 2015, Rio de Janeiro, RJ, Brazil

III b. Outside ICRANet

Lesson for graduates in the cycle courses “Escola de inverno 2015”. Location: Observatorio Nacional.
Topic: The Early Universe.

Mini course for PhD and Post-PhD. Location: Observatorio Nacional. Topic: The CAMB code.

IV. Other

Affiliations:

J-PAS collaboration, Javalambre-Physics of the Accelerated Universe Astrophysical Survey.

SDSS IV collaboration, Sloan Digital Sky Survey.

2014 List of Publication

“Primordial Non-Gaussianities of inflationary step like models” Camila P. Novaes, M. Benetti, A. Bernui (arXiv:1507.01657. Submitted in JCAP - Journal of Cosmology and Astroparticle Physics)

”Baryon Acoustic Oscillations from the SDSS DR10 galaxies angular correlation function” G. C. Carvalho, A. Bernui, M. Benetti, J. C. Carvalho, J. S. Alcaniz (arXiv:1507.08972. Submitted in Phys. Rev. D)

Position: PhD. Student
Period covered: 2011 - 2015



I Scientific Work

Soft gamma ray repeaters (SGRs) and anomalous X-ray pulsars (AXPs) are compact objects that can be explained as massive fast rotating white dwarfs. The stability properties of white dwarfs can account for the observed periods (2-12 secs) of these objects and their rotational energy loss can explain the high luminosities in x and gamma ray bands. I am focused on the magnetospheric emission of these objects, in order to explain the emission in X and gamma rays, taking into account the backflow of positrons coming from the magnetosphere and from the interaction between gamma-ray curvature photons and the intense magnetic fields ($B \sim 10^8 - 10^9$ G).

I also worked on the stability of magnetized white dwarfs, in particular, the microscopic instabilities coming from the Inverse-beta decay, the Pycnonuclear reactions and General Relativity.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Assistance to meetings organized by Icara such as:

1. 13th Marcel Grossman Meeting, July 1-7, 2012. Stockholm, Sweden.
2. IRAP PhD. Erasmus Mundus School. September 3 – 21, 2012. Nice, Frances.
3. 1st Scientific ICRANet Meeting in Armenia, June 30 – July 4, 2014. Yerevan, Armenia.
4. 14th Marcel Grossman Meeting, July 12-18, 2015. Rome, Italy

Participation with oral presentation in the following events:

- “On the stability of highly magnetized white dwarfs”. Diego Leonardo Cáceres Uribe, Jorge Armando Rueda Hernández and Remo Ruffini. 2nd Bego Rencontres, Universitè Nice Sophia Antipolis. 16-31 May 2013, Nice, France.

- “High Magnetic Fields in White Dwarfs”. Diego Leonardo Cáceres Uribe, Jorge Armando Rueda Hernández and Remo Ruffini. *The 13th Italian-Korean Symposium on Relativistic Astrophysics*. 15-19 July 2013, Seoul-Korea, 2013.
- “Magnetospheric emission of soft gamma-ray repeaters (SGRs) and anomalous x-ray pulsars (AXPs) within the white dwarf model”. *The 27th Texas symposium on relativistic astrophysics*. 8 – 13 December, 2013, Texas, United States of America.
- “Soft Gamma-Ray Repeater and Anomalous X-Ray Pulsars as Highly Magnetized Massive Highly Rotating White Dwarfs”. Diego Leonardo Cáceres Uribe, Jorge Armando Rueda Hernández and Remo Ruffini. *3rd Bego Rencontres, Université Nice Sophia Antipolis*. 8 – 19 September 2014, Nice, France.
- “On the Spin-Down of Anomalous X-Ray Pulsars and Soft Gamma-Ray Repeater as Pulsar White Dwarfs”. Diego Leonardo Cáceres Uribe, Jorge Armando Rueda Hernández and Remo Ruffini. *4th Marcel Grossman Meeting*, July 12-18, 2015. Rome, Italy.

2015 List of Publications

1. “Dynamical instability of white dwarfs and breaking of spherical symmetry under the presence of extreme magnetic fields”. J. G. Coelho, R. M. Marinho Jr., M. Malheiro, R. Negreiros, D. L. Cáceres, J. A. Rueda and R. Ruffini [arXiv: 1306.4658v2]. *The Astrophysical Journal*, Volume 794, Issue 1, 86 (2014).
2. “On the stability of ultra-magnetized white dwarfs”. Diego L. Cáceres, Jorge A. Rueda and Remo Ruffini. *Journal of the Korean Physical Society*. Volume 65, Issue 6, pp. 846-849.
3. “On the rotation-power of Anomalous X-ray Pulsars and Soft Gamma-ray Repeater”. Jaziel Coelho, Rafael C. R. de Lima, Diego L. Cáceres, Manuel Malheiro, Jorge A. Rueda and Remo Ruffini. Submitted to *Astrophysical Journal*.
4. “Thermal X-ray emission from Massive, Fast Rotating, highly magnetized White Dwarfs”. Diego L. Cáceres, Jaziel G. Coelho, Sheyde M. de Carvalho, Rafael C. R. de Lima, Jorge A. Rueda, Remo Ruffini. To be submitted.

Position: PhD Students
Period covered: 2012-2015



I Scientific Work

Research activities in Supernovae: observations, photometric and spectroscopic data reduction and data analysis, in both optical and near-infrared bands, of a wide range of SNe types from hydrogen-rich to he-poor.

The aim of this work is the study of different types of core-collapse supernovae. The study of photometric and spectroscopic evolutions of single objects is important to highlight the main characteristics of the target. A comparison with the literature is also necessary to identify common or peculiar behaviours.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- MG14: “Fourteenth Marcel Grossman Meeting”, 12 July 2015 → 18 July 2015, Roma (Italy)
- EWASS2015: “European Week of Astronomy and Space Science”, 22 June 2015 → 26 June 2015, La Laguna (Tenerife)
- “PESSTO meeting” organized by Prof M. Dennefeld and Prof. S.J. Smartt, 15 June 2015 → 17 June 2015, Paris (France)
- “Opticon observing school and Awareness conference” organized by Prof M. Dennefeld, 17 September 2014 → 1th October 2014, Rozhen & Sofia (Bulgaria)
- 1st Scientific ICRANet Meeting in Armenia “Black Holes: the largest energy sources in the Universe”, June 30 → 4 July 2014, Yerevan (Armenia)
- “PESSTO meeting” organized by Prof. S.J. Smartt, 19 June 2014 → 21 June 2014, Belfast (UK)
- IRAP PhD and ERASMUS MUNDUS Workshop on “Supernovae, Gamma-ray bursts and the induced gravitational collapse” organized by Prof. R. Ruffini and Prof. P. Chardonay, 11 May 2014 → 16 May 2014, Les Houches (France)

- IRAP PhD and ERASMUS MUNDUS School “*Nice winter school*” organized by Prof. R. Ruffini and Prof. P. Chardonay, 23 February 2014 – 2 March 2014, Nice (France)

- “*PESSTO meeting*” organized by Prof. M. Della Valle and Prof. S.J. Smartt, 6 October 2013 → 8 October 2013, Napoli (Italy)

- 10 nights of observations at the ESO NTT Telescope in La Silla as third astronomer, 21 July 2013 → 22 August 2013, La Silla (Cile)

- “*The first URCA meeting on Relativistic Astrophysics*” organized by Prof. R. Ruffini, 24 June 2013 → 29 June 2013, Rio de Janeiro (Brasil)

- “*The 2013 yearly ICRANet Scientific Meeting on Relativistic Astrophysics*” held by Prof. R. Ruffini, 3 June 2013 → 21 June 2013, Pescara (Italy)

- Seminars on “*Second Bego Scientific Rencontre Meeting*” organized by Prof. R. Ruffini, 16 May 2013 → 31 May 2013, Nice (France)

- “*PESSTO meeting*” organized by Prof. M. Turatto and Prof. S.J. Smartt, 28 April 2013 → 30 April 2013, Padova (Italy)

II c Diploma thesis supervision

Supervisor: Massimo Della Valle

Thesis: “*The fickle death of massive stars: from Hydrogen-rich to He-poor Supernova explosions*”

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

- Talk on “*The first URCA meeting on Relativistic Astrophysics*” organized by Prof. R. Ruffini, 24 June 2013 → 29 June 2013, Rio de Janeiro (Brasil): “*On the supernovae shock-breakout*”

- Talk on “*Second Bego Scientific Rencontre Meeting*” organized by Prof. R. Ruffini, 16 May 2013 → 31 May 2013, Nice (France): “*The photometric and spectroscopic evolution of type IIP SN 2012e?*”

III b. Outside ICRANet

- Talk on “*PESSTO meeting*” organized by Prof M. Dennefeld and Prof. S.J. Smartt, 15 June 2015 → 17 June 2015, Paris (France): “*Preliminary results on SN LSQ14efl*”

- Talk on “*PESSTO meeting*” organized by Prof. S.J. Smartt, 19 June 2014 → 21 June 2014, Belfast (UK): “*The photometric and spectroscopic evolution of type IIP SN 2012e?*”

- Talk on “*PESSTO meeting*” organized by Prof. M. Della Valle and Prof. S.J. Smartt, 6 October 2013 → 8 October 2013, Napoli (Italy): “*Preliminary results of type IIP SN 2012e?*”

- Talk on “PESSTO meeting” organized by Prof. M. Turatto and Prof. S.J. Smartt, 28 April 2013 → 30 April 2013, Padova (Italy): “*Preliminary results of type IIP SN 2012ec*”

2013-2015 List of Publication

1) “*SN 2012ec: mass of the progenitor from PESSTO follow-up of the photospheric phase*”

Barbarino, C., Dall'Ora, M., Botticella, M.T., et al. 2015, MNRAS, 448, 2312

2) “*Supersolar Ni/Fe production in the Type IIP SN 2012ec*”

Jerkstrand, A., Smartt, S.~J., Sollerman, J., et al. 2015, MNRAS, 448, 2482

3) “*PESSTO: survey description and products from the first data release by the Public ESO Spectroscopic Survey of Transient Objects*”

Smartt, S.~J., Valenti, S., Fraser, M., et al. 2015, A&A, 579, A40

4) “*A search for Fermi bursts associated with supernovae and their frequency of occurrence*”

Kovacevic, M., Izzo, L., Wang, Y., et al. 2014, A&A, 569, A108

5) “*Induced gravitational collapse at extreme cosmological distances: the case of GRB 090423*”

Ruffini, R., Izzo, L., Muccino, M., et al. 2014, A&A, 569, A39

6) “*Supernova 2012ec: identification of the progenitor and early monitoring with PESSTO*”

Maund, J.~R., Fraser, M., Smartt, S.~J., et al. 2013, MNRAS, 431, L102

Cipolletta Federico

Position: IRAP PhD, XI Cycle

Period covered: 2013-2016



I Scientific Work

- Bachelor Degree in Mathematics, University of Camerino (MC), Italy, from a.y.2006/2007 to a.y. 2008/2009. Graduation thesis' title: "Rational Tangles and Continued Fractions".

- Master Degree in Mathematics, University of Camerino (MC), Italy, from a.y. 2009/2010 to a.y. 2010/2011. Graduation thesis' title: "Avoidance of singularities for charged collapsing relativistic solutions in spherical symmetry".

- In 2013 I won a PhD grant with ICRANet (IRAP PhD). During the following period my focus has been to study numerical models to obtain equilibrium sequences of rotating, self gravitating stars, in both classical and relativistic frame. In the classical (Newtonian) framework I implemented the method by Eriguchi and Muller (Y. Eriguchi, E. Muller. "A general computational method for obtaining equilibria of self-gravitating and rotating gases", Astron. Astrophys. 146, 260-268(1985)) writing my own C code. This code allows to build equilibrium configurations of polytropic stars with for some fixed rotation laws. After testing the code with already studied rotation law (both uniform and differential), currently I am trying to insert a new two-parameter differential rotation law, to study the possible bifurcations from the main sequence and the cataclysmic event in the parameter space. In the relativistic framework I learned how to use RNS public code (written by N. Stergioulas) to build equilibrium models of rapidly rotating Neutron Stars (NSs), taking into account several "realistic" equations of state (EOS). I studied physical properties of models (stability, maximum mass, radius, angular velocity, angular momentum and binding energy and angular momentum of particles orbiting in the innermost stable circular orbit of the NS), obtaining relations useful for astrophysical applications, some of with result to be EOS-dependent and other universal.

II Conferences and educational activities

-Nice BEGO school, May 2013

-2013 ICRANet meeting on Relativistic Astrophysics on the Occasion of the 50th anniversary of the Kerr solution of the Einstein's equations in Pescara

-Nice BEGO school, September 2013

-Nice Winter school February 23 – March 2 2014

-"Supernovae, Gamma-ray bursts and the Induced gravitational collapse", May 11-16, 2014 – Les Houches (France)

-"Third BEGO Rencontres – IRAP PhD Erasmus Mundus School", September 8-19, 2014

-“Fourteenth Marcel Grossmann Meeting - MG14”, Rome (Italy), July 12-18 2015

-“14th Italian-Korean Symposium on Relativistic Astrophysics”, Pescara (Italy), July 20-24 2015

III. Service activities

Talks:

- “Rapidly Rotating Neutron Stars in full GR”, during “Third BEGO Rencontres – IRAP PhD Erasmus Mundus School”, September 8-19, 2014;

- *Structure And Stability For Realistic Rapidly Rotating NS: Full GR Treatment*, during “Fourteenth Marcel Grossmann Meeting - MG14”, Rome (Italy), July 12-18 2015;

- *Structure And Stability For Realistic Rapidly Rotating NS: Full GR Treatment*, during “14th Italian-Korean Symposium on Relativistic Astrophysics”, Pescara (Italy), July 20-24 2015;

- *Models for equilibrium configurations of rotating self-gravitating Polytropic Stars*, during “14th Italian-Korean Symposium on Relativistic Astrophysics”, Pescara (Italy), July 20-24 2015;

2015 List of Publication

Published:

- Federico Cipolletta and Roberto Giambò 2012 Class. Quantum Grav. 29 245008. doi:10.1088/0264-9381/29/24/245008 Received 3 August 2012, in final form 15 October 2012. Published 19 November 2012.

- *Fast rotating neutron stars with realistic nuclear matter equation of state*, F. Cipolletta, C. Cherubini, S. Filippi, J. A. Rueda, R. Ruffini, Phys. Rev. D 92, 023007, Published 13 July 2015.

- *Angular Momentum Role in the Hypercritical Accretion of Binary-Driven Hypernovae*, L. M. Becerra, F. Cipolletta, C. L. Fryer, J. A. Rueda, R. Ruffini, ApJ, 812, 100, Published 13 October 2015.

In Preparation:

- *On the mostly bound circular orbit around rapidly rotating neutron stars*, Authors: F. Cipolletta, J. A. Rueda, R. Ruffini.

- *On the accuracy of the Hartle-Thorne approximation in realistic rapidly rotating neutron stars*, Authors: L. M. Becerra, R. C. Rodrigues, F. Cipolletta, J. A. Rueda, R. Ruffini.

Dichiara Simone

Position: PhD - Postdoc
Period covered: 2012-2015



I Scientific Work

During my undergraduate work I have studied the impact of instrumental selection effects and biases on the measure of intrinsic physical parameters (energy released, spectral features, etc). I analysed large GRBs data sets detected by CGRO/BATSE, Fermi/GBM, Swift/BAT and Konus/WIND, including also the events without a redshift estimation. Moreover, I implemented some Monte Carlo simulations to explore the different effects introduced by instrumental thresholds in terms of $E_{p,i}$ -Eiso relation (Amati et al. 2002). A reliability check of the “Amati relation” is essential given its importance in the study of the radiative mechanism involved in these phenomena (synchrotron shock model, double comptonization model, ecc.) and as a potential cosmological tool.

During my PhD I was mainly focused on the timing analysis of GRB's light curves. I characterised the time variability using the classical Fourier technique. At first, I studied the average Power Density Spectra (PDS) of a sub-sample of bright GRBs detected by Fermi/GBM and by BeppoSAX/GRBM. Then, I studied the behaviours of the individual PDS of GRBs using a new Bayesian technique that involve the use of Markov chain Monte Carlo in order to compute the values of the PDS parameters.

This kind of analysis is basic to put constraints on the possible emission mechanism (magnetic reconnection, neutrino annihilation flow, etc) and also on the nature of the progenitor.

Combining timing and spectral features I provided important clues to probe the physical models proposed to explain the nature of the GRBs prompt emission (internal shock model, magnetised jet, etc).

During my activity I performed time-integrated and time-resolved spectral analysis of GRBs and I enhanced my knowledge about the statistical issues behind the data analysis. I studied different techniques to investigate the timing properties of this kind of sources. One promising technique is the Singular Spectrum Analysis (SSA), which allows to decompose the series into a set of eigenvectors (main components) derived in a completely data-driven way.

Furthermore, thanks to the close collaboration between my advisor Cristiano Guidorzi (University of Ferrara) and the Astrophysics Research Institute (Liverpool John Moore University), I had the opportunity to collaborate with the local GRB group on the common optical follow-up project. I used the Las Cumbres Observatory Global Telescope Network (LCOGT) to study the GRB afterglow candidates and I developed my own procedure to remove the noise component from the images collected by RINGO3 (the polarimeter mounted to Liverpool Telescope). I implemented the 2-D extension of the SSA technique to remove the noise contaminations from the images collected by different telescopes.

Lastly, I produced a catalogue of Solar X-ray Flares detected by BeppoSAX/GRBM developing a devoted detection algorithm. This work is very important considering that BeppoSAX operated during one of the latest intense maxima of the 11-year solar cycle.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- May 2012 , Munich (Germany), “Fermi/Swift GRB conference 2012” (poster, title: “An investigation of the impact of selection and instrumental effects on the observed E_p - E_{iso} correlation”)
- September 2012, Naples, “III Congresso nazionale GRB 2012 - Lampi su Napoli” (talk, title: “Average power density spectra of long GRBs detected with BeppoSAX/GRBM and with Fermi/GBM”)
- April 2014, Ferrara , “PRIN Meeting on Gamma Ray Bursts” (talk, title: “A search for pulsations in short GRB to constrain their progenitors”)
- September 2013, Ferrara, “VIII CNOC” (national conference on astrophysics of compact objects)
- June 2013, Pescara, “The 2013 yearly ICRANet Scientific Meeting on Relativistic Astrophysics”
- October 2013, Bologna, - GDRE meeting Oct 1-2, 2013: "Down of the gamma ray bursts"

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

2014 List of Publication

- **Dichiara, S.**; Guidorzi, C.; Amati, L.; Frontera, F.; Margutti, R., 2015, submitted to Astronomy & Astrophysics, “A correlation between peak energy and Fourier power density spectrum slope in gamma–ray bursts”
- Guidorzi, C.; **Dichiara, S.**; Amati, L.; 2015, submitted to Astronomy & Astrophysics, “Individual power density spectra of Swift gamma–ray bursts”
- D. Kopac, C. G. Mundell, J. Japelj, D. M. Arnold, I. A. Steele, C. Guidorzi, **S. Dichiara**, S. Kobayashi, A. Gomboc, R. M. Harrison, G. P. Lamb, A. Melandri, R. J. Smith, F. J. Virgili, A. J. Castro-Tirado, J. Gorosabel, A. Jarvinen, R. Sanchez-Ramirez, S. R. Oates, M. Jelinek, 2015, The Astrophysical Journal, 813, article id.1 , "Limits on optical polarization during the prompt phase of GRB 140430A"
- Guidorzi, C.; **Dichiara, S.**; Frontera, F.; Margutti, R.; Baldeschi, A.; Amati, L., 2015, The Astrophysical Journal, 2015, The Astrophysical Journal, 801, article id. 57 , “A common stochastic process rules gamma-ray burst prompt emission and X-ray flares”
- Castignani, G.; Guetta, D.; Pian, E.; Amati, L.; Puccetti, S.; **Dichiara, S.**, 2014, Astronomy & Astrophysics, 565, id.A60, “Time delays between Fermi-LAT and GBM light curves of gamma-ray bursts”
- **Dichiara, S.**; Guidorzi, C.; Amati, L.; Frontera, F., 2013, Monthly Notices of the Royal Astronomical Society, 431, 3608-3617, “Average power density spectrum of long GRBs detected with BeppoSAX/GRBM and with Fermi/GBM”
- **Dichiara, S.**; Guidorzi, C.; Frontera, F.; Amati, L., 2013, The Astrophysical Journal, 777, article id. 132, “A Search for Pulsations in Short Gamma-Ray Bursts to Constrain their Progenitors”

- Frontera, F.; Amati, L.; Farinelli, R.; **Dichiara, S.**; Guidorzi, C.; Landi, R.; Titarchuk, L., 2013, The Astrophysical Journal, 779, article id. 175, “Comptonization Signatures in the Prompt Emission of Gamma-Ray Bursts”
- Amati, Lorenzo; **Dichiara, Simone**, 2013, Acta Polytechnica (supplement), 53, 686, “Investigating the E_p , i –Eiso Correlation”

GCN list:

- Amati, L.; **Dichiara, S.**; Frontera, F.; Guidorzi, C., 2013, GCN 14503, “GRB 130427A in the e_p, i - eiso plane.”
- Amati, L.; **Dichiara, S.**; Frontera, F.; Guidorzi, C.; Izzo, L.; Della Valle, M., 2013, GCN 15025, “GRB 130702A in the e_p, i - eiso plane.”
- Guidorzi, C.; **Dichiara, S.**, 2014, GCN 16529, “GRB 140705A / SGR 1935+2154: FTN observations”
- C. Guidorzi; **S. Dichiara**; C.G. Mundell, 2014, GCN 16612, “GRB 140719A: FTS observations”
- **S. Dichiara**; C. Guidorzi; C.G. Mundell; A. Gomboc, 2014, GCN 16647, “GRB 140730A: LCO-Sutherland observations”
- **S. Dichiara**; C. Guidorzi; D. Kopac, 2014, GCN 16723, “Fermi 430148973/MASTER candidate: LCO-Sutherland observations”
- **S. Dichiara**; C. Guidorzi; J. Japelj, 2014, GCN 16781, “GRB 140903A: FTN observations”
- **S. Dichiara**; C. Guidorzi; J. Japelj, 2014, GCN 16821, “GRB 140916A: FTS observations”
- C. Guidorzi; D. Kopac; C. Mundell; **S. Dichiara**, 2014, GCN 16853, “GRB 140928A: LCO-Cerro Tololo further observations”
- **S. Dichiara**; C. Guidorzi, 2014, GCN 17082, “GRB 141121A: LCO-FTN observations”
- **S. Dichiara**; C. Guidorzi, 2014, GCN 17092, “GRB 141121A: LCO-FTN rebrightening confirmation”

- C. Guidorzi; **S. Dichiara**; D. Kopac; A. Gomboc, GCN 17209, “GRB 141221A: LCOGT-McDonald optical afterglow observations”
- Guidorzi, C.; **Dichiara, S.**; Mundell, C. G.; Gomboc, A., GCN 17316, “GRB 150120B: FTN optical afterglow confirmation. ”
- Guidorzi, C.; **Dichiara, S.**; Mundell, C. G.; Gomboc, A., GCN 17340, “GRB 150120B: FTN early optical light curve.”
- **Dichiara, S.**; Guidorzi, C.; Kopac, D.; Gomboc, A.; Mundell, C. G., GCN 17412, “GRB 150204A: LCOGT-Sutherland and Siding Springs observations.”
- **S. Dichiara**, C. Guidorzi, C.G. Mundell, A. Gomboc, GCN 17868, "GRB 150523A: LCOGT Cerro-Tololo optical afterglow candidate"
- **S. Dichiara**, C. Guidorzi, S.Kobayashi, C.G. Mundell, A. Gomboc, GCN 17869, "GRB 150523A: LCOGT FTS afterglow confirmation"
- **S. Dichiara**, C. Guidorzi, D. Kopac, GCN 18049, "GRB 150722A: LCOGT-Sutherland observations"
- **S. Dichiara**, C. Guidorzi, C.G. Mundell, S. Kobayashi, A. Gomboc, GCN 18083, “GRB 150727A: LCOGT-Cerro Tololo observations”
- **S. Dichiara**, C. Guidorzi, C.G. Mundell, S. Kobayashi, A. Gomboc, GCN 18090, "GRB 150728A: FTN observations"
- **S. Dichiara**, C. Guidorzi, C.G. Mundell, S. Kobayashi, A. Gomboc, GCN 18158, "GRB 150817A: LCOGT observations"
- **S. Dichiara**, C. Guidorzi, S. Kobayashi, A. Gomboc, C. Mundell, GCN 18266, "GRB 150910A: LCOGT FTN afterglow observations"
- **S. Dichiara**, D. Kopac, C. Guidorzi, S. Kobayashi, A. Gomboc, GCN 18510, "GRB 151027A: LCOGT-McDonald afterglow observations"

- **S. Dichiara**, D. Kopac, C. Guidorzi, S. Kobayashi, A. Gomboc, GCN 18520, "GRB 151027B: LCOGT FTN afterglow observations"
- **S. Dichiara**, C. Guidorzi, S. Kobayashi, A. Gomboc, GCN 18530, "GRB 151029A: LCOGT-FTS afterglow observations"
- **S. Dichiara**, C. Guidorzi, S. Kobayashi, A. Gomboc, GCN 18581, "GRB 151111A: LCOGT-FTS afterglow observations"



Position: IRAP PhD, XII Cycle
Period covered: 2013-2016

I Scientific Work

Bachelor of physics, Universidad Industrial de Santander, Bucaramanga. Graduation thesis: “Slow Gravitational Collapse of dissipative anisotropic spherical matter configuration”

Current Research: Binary systems, accretion discs, hypercritical accretion, neutrino emission

II Conferences and educational activities

II a Conferences and Other External Scientific Work

1. *IRAP Ph.D. Erasmus Mundus Workshop, Supernovae, Gamma-ray bursts and the induced gravitational collapse*, May 11th–16th, 2014 Les Houches (France). Asistant.
2. *1st Scientific ICRANet Meeting in Armenia: Black Holes: the largest energy sources in the Universe*, June 30th –July 4th, 2014. Yerevan, Armenia. Asistant
3. *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
4. *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.
5. *The Second ICRANet César Lattes Meeting. Rio de Janeiro, Brasil. April 13rd-18th, 2015. “Angular Momentum Tranfer During the Hypercritical Accretion in Binary-Driven-Hypernova”* L. Becerra, F. Cippolletta, F. Fryer, J. Rueda and R. Ruffini.
6. *Fourteenth Marcel Grossmann Meeting – MG14. Rome, Italy. July 12nd-18th, 2015. “Angular Momentum Tranfer Role in the Hypercritical Accretion of Binary-Driven-Hypernova”* L. Becerra, F. Cippolletta, F. Fryer, J. Rueda and R. Ruffini.
7. *Fourteenth Marcel Grossmann Meeting – MG14. Rome, Italy. July 12nd-18th, 2015. “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

II b Work With Students

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

IV. Other

2014 List of Publication

Hypercritical Accretion, Induced Gravitational Collapse, and Binary-Driven Hypernova. L.M. Becerra et. al. Swift 10th anniversary conference proceedings. 2-5 Decembre, 2014.

Angular Momentum Role in the Hypercritical Accretion of Binary-Driven-Hypernova. Becerra, L., Cipolleta, F., Fryer, C.L., Rueda, J. A., and Ruffini, R. 2015, ApJ, 812, 100

Harutyunyan Vahagn

Position: PhD

Period covered: 2013-2016



I Scientific Work

My current research is dedicated of measuring SN rate as a function of environment and radio luminosity of the galaxies. I exploit data from SUDARE (Supernova Diversity And Rate Evolution) survey, which is conducted with the ESO VST telescope with the aim to measure rates of different SN type in $0 < z < 0.8$ redshift range. For this task the study being performed on two best-studied extragalactic fields, CDFS and COSMOS.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

Supervisor: Massimo Della Valle

Thesis: Supernova Diversity from Galaxy Cluster Diversity: Rates and Hints on Supernova Progenitors

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

Research: We aim to analyze if at higher redshifts both type Ia and CC SN rates follow the same trend that of the local Universe. For this purpose we cross-matched the galaxy sample monitored by SUDARE with VLA catalog. The Supernova Diversity And Rate Evolution (SUDARE) is a SN survey that aims to measure the SN rates as a function of redshift, sSFR, stellar mass and radio and infrared luminosity of galaxies. The SN search is performed in two of the best-studied extragalactic fields, the CDFS and COSMOS. The cadence of observation, during the first two years of our program, is every 3 days in r band and 1 week in g, i bands to obtain multicolor light curves for photometric typing of transients. We collected 117 SNe, from which 57% are type Ia SNe To analyze if the SN rates also increase with infrared luminosity we cross-matched the SUDARE galaxy sample with MIR SWIRE catalog. In the LIRG subsample 8 SNe have been discovered. The SN Ia and CC rate measurement in radio and infrared galaxy samples is in preparation.

IV. Other

2014 List of Publication

1. V. Harutyunyan, M. T. Bottcella, E. Cappellaro, M. Della Valle, G. Pignata, L. Greggio, Supernova rates as a function of radio luminosity from SUDARE Survey (in preparation)
2. V. Harutyunyan, M. T. Bottcella, E. Cappellaro, M. Della Valle, G. Pignata, L. Greggio, SN rates in Galaxy Groups luminosity from SUDARE survey (in preparation)

Moradi Rahim

Position: IRAP PhD Thirteenth Cycle
Period covered: 2014-2017



I Scientific Work

GRBs, Blackholes, Cosmological Black Holes and their connections with GRBs.

II Conferences and educational activities

Fourteenth Marcel Grossmann Meeting - MG14, July 12-18, 2015, La Sapienza University, Rome, Italy

Talk Tittle: Thermal component in induced gravitational collapse scenario

14th Italian-Korean Symposium on Relativistic Astrophysics, July 20-24, 2015 ICRANet, Pescara (ITALY)

Talk Tittle: The spherical perfect fluid collapse with pressure in a FRW background

2015 List of Publications

Cosmological black holes: the spherical perfect fluid collapse with pressure in a FRW background
R.Moradi et al
Journal-ref: Class. Quantum Grav. 32 (2015) 215001

Induced gravitational collapse in FeCO Core–Neutron star binaries and Neutron star–Neutron star binary mergers

R. Ruffini et al., 2015. 28 pp.

Published in Int.J.Mod.Phys. A30 (2015) 28n29, 1545023

Rodriguez Ruiz, Jose Fernando

Position: PhD Student
Period covered: 2014-2017



I Scientific Work

Publications

Proceedings

- J. F. Rodriguez, Y. Rodriguez, Abstract: The Mechanism of the Relaxed Universe: Possible Dynamical Solution, and Free of Fine-Tuning, to the Old Cosmological Constant Problem (in Spanish). Proceedings of the XXIV National Congress on Physics, Bogota - Colombia, Oct. 3rd, 2011. ISBN 978-958-761-025-3

Articles

- J. F. Rodriguez, Y. Rodriguez, The Mechanism of the Relaxed Universe: Possible Dynamical Solution, and Free of Fine-Tuning, to the Old Cosmological Constant Problem (in Spanish). Rev. Acad. Colomb. Cienc. ISBN 0370-3908, accepted for publication on January 30th, 2013
- J. F. Rodriguez, Y. Rodriguez, Analysis of Vector-Inflation Models Using Dynamical Systems, Nuclear Physics B Proceeding Supplement.

II Conferences and educational activities

II a Contributed Talks

- J. F. Rodriguez, Y. Rodriguez, The Mechanism of the Relaxed Universe: Possible Dynamical Solution, and Free of Fine-Tuning, to the Old Cosmological Constant Problem (in Spanish). Presented at XXIV National Congress on Physics, Bogota - Colombia, Oct. 3rd, 2011.
- J. F. Rodriguez, Y. Rodriguez, The Mechanism of the Relaxed Universe: Possible Dynamical Solution, and Free of Fine-Tuning, to the Old Cosmological Constant Problem (in Spanish). Presented at Third Colombian Congress on Astronomy, Bucaramanga - Colombia, Nov. 5th, 2012.
- J. F. Rodriguez, Y. Rodriguez, Analysis of Vector Inflation Models Using Dynamical Systems Presented at Fundamental Issues of the Standard Cosmological Model, Institut d'Etude Scientifique de Cargese (IESC) Cargese - France, Sept. 21st- 27th, 2014.

2015 List of Publication

IRAP Ph. D. Erasmus Mundus Students

Martins de Carvalho Sheyse

Position: PosDoc at Universidade Federal Fluminense (Brazil)
Period covered: 2013-2015



I Scientific Work

a – White Dwarfs: The Feynman-Metropolis-Teller (FMT) treatment considering a classic non-relativistic Thomas-Fermi model confined in a Wigner-Seitz cell has been recently generalized to relativistic regimes and applied to the description of non-rotating white-dwarfs in general relativity. We extended the FMT treatment to the case of finite temperatures for white dwarfs with different nuclear compositions. Our aim is to understand the effects of finite temperatures on the structure of white dwarfs, constructing and analyzing their equation of state and mass-radius relation.

b – Thermal Evolution of Neutron Stars: It is known that their cooling evolution could reveal crucial information on the properties of matter at high density and pressure. So, the modeling of the thermal structure evolution together with its observation allow us, to probe the microscopic and macroscopic properties of neutron stars. The observed properties of neutron stars are extremely sensitive to the star's composition. Taking account the analysis of these properties, it is possible to constrain the equation of state of dense matter and its composition. We explore a new model for the inner structure of neutron stars formulated by Belvedere et al.(2012), where it is considered the condition of global charge neutrality instead of local charge neutrality, which changes the star's structure and composition.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- The second ICRANet César Lattes Meeting

II b Work With Students

- Globally – neutral neutron star and strange star cooling comparison

student: Ibsen Gomes, Universidade Federal Fluminense

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*

IV. Other

2015 List of Publication

-Title: *Thermal Evolution of Hybrid stars within the framework of a non-local NJL model.*

Authors: *S. M. de Carvalho, R. Negreiros, M. Orsaria, G. A. Contrera, F. Weber and W. Spinella.*

Published at *Physical Rev. C* – DOI: 10.1103/PhysRevC.92.035810

-Title: *Thermal X-Ray emission from massive, fast rotating, highly magnetized white dwarf.*

Authors: *D.L. Cáceres, Jaziel G. Coelho, S. M. de Carvalho, R.C.R. de Lima, J. Rueda and R. Ruffini.*

To be submitted.

List of publications:

- *On the cooling of globally-neutral neutron star. Journal of the Korean Physical Society. V.65, p.861-864, 2014.*

Authors: *S. M. de Carvalho, Jorge A. Rueda and Remo Ruffini.*

- *Relativistic Feynman- Metropolis- Teller treatment at finite temperatures. Physical Review C. V.89, p. 015801, 2014.*

Authors: *S. M. de Carvalho, M. Rotondo, Jorge A. Rueda and Remo Ruffini.*

- *Thermal evolution of neutron stars with global and local neutrality. Physical Review C. v.90, p. 0055804, 2014.*

Authors: *S. M. de Carvalho, R. Negreiros, Jorge A. Rueda and Remo Ruffini.*

Bégué Damien

Position: Postdoc at the Royal Institute of Technology
Stockholm, Sweden
Period covered: 2015



I Scientific Work

Photospheric emission of Gamma-Ray bursts, magnetic reconnection, non-thermal emission in the framework of the external shock model.

II Conferences and educational activities

Cesare Lattes Meetings, Rio, April 2015

III. Service activities

IV. Other

2015 List of Publication

Poynting-flux dominated Jets challenged by their Photospheric emission, Bégué and Pe'er, ApJ 802 134B, 2015

Gregoris Daniele

Position: Postdoctoral fellow at Dalhousie University (Halifax, Canada) within the AARMS program since 1st June 2015

Period covered: 1st January – 11th November 2015

I Scientific Work

My scientific interests are:

- Application on the nonideal equation of state of Shan-Chen in cosmology
- Application of black hole lattices in cosmology
- Equivalence problem in General Relativity
- Geroch transform in General Relativity
- Averaging problem in General Relativity

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

I have been working with the students of the research group of Prof. Alan Coley to which I belong at Dalhousie University

II c Diploma thesis supervision

II d Other Teaching Duties

I gave two lectures of the course Math 1010 in the Fall term at Dalhousie University

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

Talks at international conferences:

“Application of black hole lattices in relativistic cosmology”,

Second Cèsar Lattes meeting, Rio de Janeiro, 13th - 18th April 2015

“Applications of the nonideal Shan-Chen equation of state in cosmology”,
International Conference on Gravitation and Cosmology, the fourth Galileo-
Xu Guangqi meeting, Kavli Institute for Theoretical Physics China at the
Chinese Academy of Sciences (KITPC) Beijing - China May 4-8, 2015

III b. Outside ICRANet

Visitor, Queen Mary University London (22nd - 28th March 2015)

Talk:

“Application of black hole lattices in relativistic cosmology”,
St. Francis Xavier University, Antigonish (Canada), October 15, 2015

IV. Other

2015 List of Publication

Proceedings:

T. Clifton, D. Gregoris, K. Rosquist, “Application of black hole lattices
in relativistic cosmology”, submitted as proceeding for the 2CL meeting

On referred journals:

D. Bini, A. Geralico, D. Gregoris, P. Mocz, S. Succi, “CMB constraints on cosmological models with
fluids obeying a Shan-Chen-like equation of state”, submitted to Physics Letters B

Pisani Giovanni Battista

Position: Assegnista di Ricerca (Post-Doc),
Sapienza University of Rome, Rome, Italy and
ICRANet, Pescara, Italy

Period covered: 1st April 2015 – 31st March 2016

Former position: Ph.D. Student, Erasmus
Mundus IRAP Ph.D. Program

Period covered: 1st September 2011 – 26st
November 2014



I Scientific Work

Gamma Ray Bursts (GRBs) are among the most puzzling astronomical objects since their first detection by the Vela satellites in the late 1960s. GRBs are flashes in gamma-rays observed in distant galaxies. They can last from milliseconds to several minutes with an isotropic energy released up to the order of one solar mass. This peculiarity makes them the most powerful events ever observed in the Universe. A variety of models have been developed to theoretically explain the observational properties of GRBs.

My PhD research project includes the reduction and analysis of GRBs data from different satellites, such as Batse, Swift or Fermi. I investigate GRBs observations within the fireshell model scenario, which predicts that GRBs originate from an optically thick e^+e^- plasma at thermal equilibrium created by vacuum polarization during the formation of a Black Hole.

My attention is focused on GRBs associated with Supernovae (SN). Since the first discovery of this association (GRB 980425 - SN1998wt), various mechanisms have been proposed to explain it. Recently Prof. Ruffini and his collaborators have proposed the Induced Gravitational Collapse (IGC) occurring in a particular class of binary systems as progenitors for the GRB-SN sources having a released isotropic energy above 10^{52} ergs. We refer to such phenomena as Binary-driven HyperNovae (BdHNe). Together with them we are further developing the BdHN paradigm and enlarging the sample of BdHN candidates. One of the most exciting outcomes of this work is the possibility to consider this class of BdHN events as a standard candle. If confirmed, this result could provide new independent challenges on the current cosmological model back to 600 millions years only after the Big Bang.

During my current Post-Doc research project, basing on my Ph.D. thesis results, I am focusing on building a complete sample of BdHNe looking at redshifts larger than $z \sim 1$, in order to drastically enlarge our current sample and to confirm that the standard candle hypothesis holds at larger cosmological distances. My recent analysis points to a non-spherical emission of the late X-ray of BdHNe which is supposedly generated by the young SN remnant. This result is in agreement with the observations of non-spherical SN remnants.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- 1) “Erasmus Mundus School”, Nice, France, 5th - 17th September, 2011;
- 2) “IRAP Erasmus Mundus Workshop”, Les Houches, France, 2nd - 6th October, 2011;
- 3) “Third Galileo-Xu Guangqi” meeting, Beijing, China, 11th - 15th October, 2011;
- 4) “Fermi/Swift GRB 2012 Conference”, Munich, Germany, 7th – 11th May, 2012;

Poster 1: The proto-black hole concept in GRB 101023 and its possible extension to GRB 110709B; A.V. Penacchioni, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, G.B. Pisani;

Poster 2: Needs for a new GRB classification following the fireshell model: "genuine short", "disguised short" and "long" GRBs; C.L. Bianco, M.G. Bernardini, L. Caito, G. De Barros, L. Izzo, M. Muccino, B. Patricelli, A.V. Penacchioni, G. B. Pisani, R. Ruffini.

- 5) “Erasmus Mundus School”, Nice, France, 4th – 8th June, 2012;

Lecture: A new interpretation for the disguised short GRB 060614; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, J. A. Rueda, M. Muccino, A. V. Penacchioni.

- 6) “13th Marcel Grossmann Meeting”, Stockholm, Sweden, 1st - 7th July, 2012;

Talk: A new possible interpretation for GRB 060614; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, J. A. Rueda, M. Muccino, A. V. Penacchioni.

- 7) “Erasmus Mundus School”, Nice, France, 3rd – 19th September, 2012;

Lecture: The class of “disguised” short GRBs within the fireshell model and the particular case of GRB 060614; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni.

- 8) III National Congress “Lampi su Napoli”, Naples, Italy, 20th - 22nd September, 2012;
- 9) “The Current Issues on Relativistic Astrophysics”, 5th - 6th October, 2012, Seoul, South Korea;

Talk: Evidence and consequences of universal behavior of late time X-ray emission of Gamma-Ray Bursts connected with Supernovae; G. B. Pisani, R. Ruffini, C. L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni, J. A. Rueda.

- 10) “7th Huntsville GRB Symposium”, Nashville TN, USA, 14th – 18th April, 2013;

Poster: Novel distance indicator for Gamma-Ray Bursts associated with Supernovae; G. B. Pisani, L. Izzo, R. Ruffini, C.L. Bianco, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang.

- 11) “2nd Bego Rencontres”, Nice, France, 16th – 31st May, 2013;

Talk: A new subclass of energetic GRB-SN sources: The IGC GRB-SN family; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni, J. A. Rueda.

- 12) “2013 yearly ICRANet Scientific Meeting on Relativistic Astrophysics”, Pescara, Italy, 3rd – 21th June, 2013;
- 13) “1st URCA Meeting on Relativistic Astrophysics”, Rio de Janeiro, Brasil, 24th – 29th June, 2013;

Talk: A new subclass of energetic GRB-SN sources: The IGC GRB-SN family; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni, J. A. Rueda.

14) “13th Italian-Korean Symposium on Relativistic Astrophysics”, Seoul, South Korea, 15th – 19th July, 2013;

Talk: A new subclass of energetic GRB-SN sources: The IGC GRB-SN family; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni, J. A. Rueda.

15) “Erasmus Mundus School”, Nice, France, 3rd – 20th September, 2013;

Lecture: A new subclass of energetic GRB-SN sources: The IGC GRB-SN family; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni, J. A. Rueda.

16) “27th Texas Meeting on Relativistic Astrophysics”, Dallas TX, USA, 8th - 13th, December 2013;

Talk: The IGC GRB-SN family: the cases of GRB 130427A and GRB 060614; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang.

17) “Erasmus Mundus School”, Nice, France, 23rd - 27th February, 2014;

Lecture 1: GRBs-SNe within the Induced Gravitational Collapse model; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang;

Lecture 2: The role of the High Energy in short and long GRBs; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang.

18) “Erasmus Mundus School”, Les Houches, France, 11th - 16th May, 2014;

Lecture: GRBs-SNe within the Induced Gravitational Collapse model: towards a new standard candle; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang.

19) “1st Scientific ICRANet Meeting in Armenia”, Yerevan, Armenia, 30th June - 4th July, 2014.

Talk: Energetic GRBs-SNe within the Induced Gravitational Collapse model: towards a new standard candle; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang.

20) “3rd Bego Rencontres”, Nice, France, 8th – 19th September, 2014;

Talk: Energetic GRBs-SNe within the Induced Gravitational Collapse; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang;

21) “Swift: 10 Years of Discovery”, Rome, Italy, 2nd – 5th December, 2015;

Poster: Binary-driven HyperNovae and their nested late X-ray emission; G. B. Pisani, R. Ruffini, M. Muccino, C. L. Bianco, M. Enderli, M. Kovacevic, A. V. Penacchioni, J. A. Rueda, Y. Wang, E. Zaninoni, L. Izzo;

22) “2nd Cesar Lattes Meeting”, Rio de Janeiro, Brazil, 10th – 20th April, 2015;

Talk: Perspectives for Binary-driven HyperNovae at high redshift; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang, E. Zaninoni;

23) “The XIV Marcel Grossmann Meeting”, Rome, Italy, 13th – 17th July, 2015;

Talk: Perspectives for Binary-driven HyperNovae at high redshift; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang, E. Zaninoni;

24) “The 14th Italian-Korean Symposium on Relativistic Astrophysics”, Pescara, Italy, 20th – 24th July, 2015;

Talk: Properties of the X-ray afterglow of Binary-driven HyperNovae; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang, E. Zaninoni.

II b Work With Students

None

II c Diploma thesis supervision

None

II d Other Teaching Duties

None

II e. Work With Postdocs

None

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

Teaching activities for international Ph.D. Schools organized by ICRANet. List of schools and lectures:

1) “Erasmus Mundus School”, Nice, France, 4th – 8th June, 2012;

Lecture: A new interpretation for the disguised short GRB 060614; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, J. A. Rueda, M. Muccino, A. V. Penacchioni.

2) “Erasmus Mundus School”, Nice, France, 3rd – 19th September, 2012;

Lecture: The class of “disguised” short GRBs within the fireshell model and the particular case of GRB 060614; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni;

3) “2nd Bego Rencontres”, Nice, France, 16th – 31st May, 2013;

Lecture: A new subclass of energetic GRB-SN sources: The IGC GRB-SN family; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni, J. A. Rueda.

4) “Erasmus Mundus School”, Nice, France, 3rd – 20th September, 2013;

Lecture: A new subclass of energetic GRB-SN sources: The IGC GRB-SN family; G. B. Pisani, R. Ruffini, C.L. Bianco, L. Izzo, M. Muccino, A. V. Penacchioni, J. A. Rueda.

5) “Erasmus Mundus School”, Nice, France, 23rd - 27th February, 2014;

Lecture 1: GRBs-SNe within the Induced Gravitational Collapse model; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang;

Lecture 2: The role of the High Energy in short and long GRBs; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang.

6) “Erasmus Mundus School”, Les Houches, France, 11th - 16th May, 2014;

Lecture: GRBs-SNe within the Induced Gravitational Collapse model: towards a new standard candle; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang.

7) “3rd Bego Rencontres”, Nice, France, 8th – 19th September, 2014;

Lecture: Energetic GRBs-SNe within the Induced Gravitational Collapse; G. B. Pisani, R. Ruffini, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, M. Muccino, A. V. Penacchioni, J. A. Rueda, Y. Wang.

III b. Outside ICRANet

Teaching activity as assistant of Professor Valerio Parisi in his Physics classes for Medical Science students, Sapienza University of Rome.

IV. Other

None

List of Publications

Scientific papers published on refereed Journals (9)

- Muccino, M.; Ruffini, R.; Bianco, C. L.; Izzo, L.; Penacchioni, A. V.; **Pisani, G. B.**, ``GRB 090510: a disguised short GRB with the highest Lorentz factor and circumburst medium", 2013, ApJ, 772, 62;
- Penacchioni, A.V.; Ruffini, R.; Bianco, C. L.; Izzo, L.; Muccino, M.; **Pisani, G. B.**; Rueda, J. A., ``GRB 110709B in the induced gravitational collapse paradigm", 2013, A&A, 551, A133;
- **Pisani, G. B.**; Izzo, L.; Ruffini, R.; Bianco, C. L.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y., ``Novel distance indicator for gamma-ray bursts associated with supernovae", 2013, A&A, 552, L5;
- Ruffini, R.; Muccino, M.; Bianco, C. L.; Enderli, M.; Izzo, L.; Kovacevic, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A.; Wang, Y., ``On binary-driven hypernovae and their nested late X-ray emission", 2014, A&A , 565, L10;
- Ruffini, R.; Izzo, L.; Muccino, M.; **Pisani, G. B.**; Rueda, J. A.; Wang, Y.; Barbarino, C.; Bianco, C. L.; Enderli, M.; Kovacevic, M., ``Induced gravitational collapse at extreme cosmological distances: the case of GRB 090423", 2014, A&A, 569, A39;
- 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 to supernovae and their frequency of occurrence", 2014, A&A, 569, A180;
- Ruffini, R.; Izzo, L.; Muccino, M.; Rueda, J. A.; Barbarino, C.; Bianco, C. L.; Dereli, H.; Enderli, M.; Penacchioni, A. V.; **Pisani, G. B.**; Wang, Y., ``Induced Gravitational Collapse in the BATSE era: the case of GRB 970828", 2015, A&A, 579, A62;
- Ruffini, R.; Wang, Y.; Kovacevic, M.; Bianco, C. L.; Enderli, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A., ``GRB 130427A and SN 2013cq: A Multi-wavelength Analysis of an Induced Gravitational Collapse Event", 2015, ApJ, 798, 10.
- Ruffini, R.; Muccino, M.; Kovacevic, M.; Izzo, L.; Bianco, C. L.; Enderli, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A.; Wang, Y.; Zaninoni, E., ``GRB 140619B: a short GRB from a binary neutron star merger leading to a black hole formation", 2015, ApJ, 808, 190.

Scientific papers submitted to refereed Journals or in preparation (3)

- Enderli, M.; Ruffini, R.; Aimuratov, Y.; Bianco, C. L.; Kovacevic, M.; Moradi, R.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A.; Wang, Y., ``GRB 090510: A Genuine Short-GRB from a Binary Neutron Star Coalescing into a Kerr-Newman Black Hole", submitted to ApJ;
- Ruffini, R.; Rueda, J. A.; Muccino, M.; **Pisani, G. B.**; Wang, Y.; Becerra, L. M.; Kovacevic, M.; Oliveira, F. G.; Bianco, C. L.; Moradi, R., ``On Rate and Nature of Short and Long GRBs", to be submitted to ApJ;
- Ruffini, R.; **Pisani, G. B.**; Aimuratov, Y.; Bianco, C. L.; Kovacevic, M.; Moradi, R.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y., ``Hints for Asphericity in the X-ray Emission of Binary-driven Hypernovae", to be submitted to A&A.

Proceedings of science (8)

- **Pisani, G. B.;** Ruffini, R.; Bianco, C. L.; Enderli, M.; Izzo, L.; Kovacevic, M.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y.; Zaninoni, E., “Perspectives for Binary-driven Hypernovae at large redshift”, 2015, POS CL2;
- **Pisani, G. B.;** Ruffini, R.; Muccino, M.; Bianco, C. L.; Enderli, M.; Kovacevic, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y.; Zaninoni, E.; Izzo, L., “Binary-driven HyperNovae and their nested late X-ray emission”, 2015, POS Swift: 10 Years of Discovery;
- **Pisani, G. B.;** Ruffini, R.; Bianco, C. L.; Enderli, M.; Izzo, L.; Kovacevic, M.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y., “The IGC GRB-SN family: the cases of GRB 130427A and GRB 060614”, 2014, POS 27th Texas Symposium;
- **Pisani, G. B.;** Ruffini, R.; Bianco, C. L.; Enderli, M.; Izzo, L.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y., “A new subclass of energetic GRB-SN sources: the IGC GRB-SN family”, 2013, POS IK13;
- **Pisani, G. B.;** Izzo, L.; Ruffini, R.; Bianco, C. L.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y., “On a novel distance indicator for Gamma-Ray Bursts associated with Supernovae”, 2013, POS Huntsville GRB Symposium;
- **Pisani, G. B.;** Izzo, L.; Ruffini, R.; Bianco, C. L.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y., “On a novel distance indicator for Gamma-Ray Bursts associated with Supernovae”, 2013, POS MG13;
- Bianco, C. L.; Bernardini, M. G.; Caito, L.; De Barros, G.; Izzo, L.; Muccino, M.; Patricelli, B.; Penacchioni, A. V.; **Pisani, G. B.;** Ruffini, R., “Needs for a new GRB classification following the fireshell model: "genuine short", "disguised short" and "long" GRBs”, 2012, POS GRB 2012 Conference;
- Penacchioni, A. V.; **Pisani, G. B.;** Ruffini, R.; Bianco, C. L.; Izzo, L.; Muccino, M., “The proto-black hole concept in GRB 101023 and its possible extension to GRB 110709B”, 2012, POS GRB 2012 Conference.

GRB Coordinates Network, Circular Service (11)

- Ruffini, R.; Aimuratov, Y.; Barres, U.; Belvedere, R.; Bianco, C. L.; Enderli, M.; Kovacevic, M.; Moradi, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.;** Rueda, J. A.; Wang, Y., “GRB 151027A: the missing GeV component”, 2015, GCN 18555, 1;
- Ruffini, R.; Bianco, C. L.; Enderli, M.; Kovacevic, M.; Li, L.; Muccino, M.; Muccino, M.; **Pisani, G. B.;** Rueda, J. A.; Wang, Y., “GRB 150906B: theoretical estimation of redshift and isotropic energy”, 2015, GCN 18296, 1;
- Ruffini, R.; Bianco, C. L.; Enderli, M.; Kovacevic, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.;** Rueda, J. A.; Wang, Y., “GRB 140206A: theoretical prediction of redshift and of supernova occurrence”, 2014, GCN 15794, 1;
- Ruffini, R.; Bianco, C. L.; Enderli, M.; Kovacevic, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.;** Rueda, J. A.; Wang, Y., “GRB 140108A: theoretical prediction of redshift and of supernova occurrence”, 2014, GCN 15707, 1;
- Ruffini, R.; Bianco, C. L.; Enderli, M.; Kovacevic, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.;** Rueda, J. A.; Wang, Y., “GRB 131202A: theoretical estimation of the redshift.”, 2013, GCN 15576, 1;

- Ruffini, R.; Bianco, C. L.; Enderli, M.; Kovacevic, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A.; Wang, Y., “GRB 060614: theoretical derivation of the redshift and need for deeper search of the host galaxy”, 2013, GCN 15560, 1;
- Ruffini, R.; Bianco, C. L.; Enderli, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A.; Sahakyan, N.; Wang, Y.; Izzo, L., “GRB 130925A: possible signatures of binary nature in the afterglow - request for observations”, 2013, GCN 15322, 1;
- Ruffini, R.; Bianco, C. L.; Enderli, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A.; Sahakyan, N.; Wang, Y., “GRB 130603B: analogy with GRB 090510A and possible connection with a supernova”, 2013, GCN 14913, 1;
- Ruffini, R.; Bianco, C. L.; Enderli, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A.; Sahakyan, N.; Wang, Y.; Izzo, L., “GRB 130609B: theoretical redshift estimation”, 2013, GCN 14888, 1;
- Ruffini, R.; Bianco, C. L.; Enderli, M.; Muccino, M.; Penacchioni, A. V.; **Pisani, G. B.**; Rueda, J. A.; Sahakyan, N.; Wang, Y.; Izzo, L., “GRB 130427A: predictions about the occurrence of a supernova”, 2013, GCN 14526, 1;
- Ruffini, R.; Izzo, L.; **Pisani, G. B.**; Bianco, C. L., “GRB 121217A theoretical estimate of redshift and of supernova occurrence”, 2012, GCN 14095, 1.

Wu Yuanbin

Position: PhD student
Period covered: 2011-2014



I Scientific Work

Work in collaboration with ICRANet:

- 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 giant-nucleus compressed 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

Conferences and schools attended during my PhD study:

- (1) Erasmus Mundus IRAP PhD school, Nice, France, September 2011
- (2) IRAP PhD Erasmus Mundus Workshop "Gamma Ray Bursts, their progenitors and the role of thermal emission", Les Houches, France, October 2011
- (3) Third Galileo - Xu Guangqi meeting, Beijing, China, October 2011
- (4) SIGRAV Graduate School -X Edition- "Astrophysical Black Holes", Como, Italy, May 2012
- (5) Erasmus Mundus IRAP PhD school, Nice, France, June 2012
- (6) 13th Marcel Grossmann Meeting, Stockholm, Sweden, July 2012
- (7) Erasmus Mundus IRAP PhD school, Nice, France, September 2012
Talk: Surface tension of neutron star matter
- (8) 2nd Bego Rencontres, Nice, France, May 2013
Talk: On the surface tension of neutron star matter
- (9) The 2013 yearly ICRANet Scientific Meeting on Relativistic Astrophysics, ICRANet, Pescara, Italy, June 2013
- (10) The 13th Italian-Korean Symposium on Relativistic Astrophysics, Seoul, Korea, July 2013.

- Talk: On the surface tension and Coulomb energy of neutron star matter
- (11) Erasmus Mundus IRAP PhD school, Nice, France, September 2013.
Talk: Einstein-Euler-Heisenberg theory and charged black holes
- (12) Erasmus Mundus IRAP PhD school, Nice, France, February 2014.
Talk: Strong electromagnetic fields in neutron stars, black holes, and laboratory experiments
- (13) Workshop "Supernovae, Gamma-ray bursts and the induced gravitational collapse", Les Houches, France, May 2014
Talk: Nonrotating Charged Black Holes in Einstein-Euler-Heisenberg Theory
- (14) 1st Scientific ICRANet Meeting in Armenia - Black Holes: the largest energy sources in the Universe, Yerevan, Armenia, June/July 2014.
Talk: Nonlinear Breit-Wheeler process in the collision of a photon with two plane waves
- (15) Erasmus Mundus IRAP PhD school, Nice, France, September 2014.
Talk: On the surface tension of the core-crust interface of neutron stars with global charge neutrality

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

Publications

- [1] J. A. Rueda, Y.-B. Wu, S.-S. Xue, *Surface tension of giant-nucleus compressed atoms*, submitted to Phys. Rev. C.
- [2] Jonas Gunst, Yuanbin Wu, Naveen Kumar, Christoph H. Keitel, Adriana Pálffy, *Direct and secondary nuclear excitation with x-ray free-electron lasers*, Physics of Plasmas 22, 112706 (2015).
- [3] Y.-B. Wu, *On the surface tension and Coulomb energy of neutron-star matter*, J. Korean Phys. Soc. 65, 850 (2014).
- [4] Y.-B. Wu, S.-S. Xue, *Nonlinear Breit-Wheeler process in the collision of a photon with two plane waves*, Phys. Rev. D 90, 013009 (2014).

- [5] J. A. Rueda, R. Ruffini, Y.-B. Wu, S.-S. Xue, *Surface tension of the core-crust interface of neutron stars with global charge neutrality*, Phys. Rev. C 89, 035804 (2014).
- [6] R. Ruffini, Y.-B. Wu, S.-S. Xue, *Einstein-Euler-Heisenberg theory and charged black holes*, Phys. Rev. D 88, 085004 (2013).
- [7] Yuquan Wu, Xiaofei Wang, Yuanbin Wu, *et al.*, *Properties of localization in silicon-based lattice periodicity breaking photonic crystal wave guides*, AIP Advances 3, 112107 (2013).
- [8] G.-Z. Ning, Y.-B. Wu, *Neutrino mass from a higher-dimensional operator*, Chin. Phys. Lett. 28, 061402 (2011).
- [9] Y. B. Wu, Y. F. Wang, X. W. Cao, *Theoretical study of enhanced Raman scattering for stratified concentric silicon-silver nanocylinders*, J. Appl. Phys. 105, 023103 (2009).
- [10] Y. B. Wu, Y. F. Wang, 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).

Oliveira Fernanda

Position: PhD student

Period covered: 2012 – 2015



I Scientific Work

My research area is devoted to study the evolution of binary systems composed of an evolved star and a neutron star and the conditions under which they lead to the process of Induced Gravitational Collapse (IGC), within the context of the gamma-ray burst (GRB) supernova (SN) connection. It supposes the study the conditions that lead to an SN explosion of the evolved star before the system could merge by the shrinking of the orbit owing to gravitational wave emission. There are in addition other conditions besides the above for the occurrence of the IGC as short orbital periods of the order of minutes. It is also studied the emission of gravitational waves from neutron star binaries originating short GRBs, and their detectability by the new generation of gravitational wave detectors such as Advanced LIGO.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

I have attended the following conferences:

2nd César Lattes Meeting. “Final Stages of a Neutron Star Binary System“, Brazil, 2015”.

14th Marcel Grossmann Meeting MG14. “Neutron Star Critical Mass and Short GRBs, Rome, 2015”.

14th Italian-Korean Symposium on Relativistic Astrophysics. “Final Stages of a Neutron Star Binary System, Pescara, 2015”.

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

Mobility (March 18 – Jun 18, 2015) at the Observatoire de la Côte d'Azur (OCA, Côte d'Azur Observatory), Nice.

2015 List of Publication

- R. Ruffini, M. Muccino, M. Kovacevic, F. G. Oliveira, J. A. Rueda, C. L. Bianco, M. Enderli, A. V. Penacchioni, G. B. Pisani, Y. Wang, and E. Zaninoni, "GRB 140619B: a short GRB from a binary neutron stars merger leading to the black hole formation", *ApJ*, 808:2, 2015.
- L. Becerra et. al., "Black Holes, Neutron Stars and Supernovae within the Induced Gravitational Collapse Paradigm for GRBs", *Proceedings of the 2nd Cesar Lattes meeting, AIP Conference Proceedings*, 2015.
- C. L. Fryer, F. G. Oliveira, J. A. Rueda, and R. Ruffini, On the Neutron Star-Black Hole Binaries Produced by Binary-driven Hypernovae, Accepted 10 November 2015 in *Phys. Rev. Lett.* (<http://journals.aps.org/prl/accepted/8707cY8cR711874719316da77b72c730addd0414f>) ; arXiv:1505.02809, 2015.

Ludwig Hendrik

Position: PhD student

Period covered: 01.01.2015 – 19.11.2015



I Scientific Work

Gravitational collapse of charged fluids in general relativity

Pulsation modes of compressed atoms in Thomas-Fermi model

Mobility Nice / Observatoire de la Côte d'Azur: non-minimally coupled $f(R)$ theories

Writing of PhD thesis

II Conferences and educational activities

II a Conferences and Other External Scientific Work

2nd César Lattes Meeting, Rio de Janeiro, April 16th 2015

14th Marcel Grossmann Meeting, Rome, July 13th 2015

IK 14 Meeting, Pescara, July 24th 2015

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

2015 List of Publication

H. Ludwig, R. Ruffini, and S.-S. Xue, “Electronic response to nuclear breathing mode,” in Proceedings of the Second César Lattes Meeting (P. Chardonnet, U. Barres, and C. A. Z. Vasconcellos, eds.), 2015.

H. Ludwig, R. Ruffini, and S.-S. Xue, “Collective electronic pulsation around giant nuclei in the Thomas-Fermi model,” Nuc. Phys. A, vol. 941, p. 1, 2015.

H. Ludwig, O. Minazzoli, and S. Capozziello, “Merging matter and geometry in the same Lagrangian,” Phys. Lett. B, vol. 751, p. 576, 2015.

Strobel Eckhard

Position: PhD Student

Period covered: September 1, 2012-August 31, 2015



I Scientific Work

Critical and overcritical Electromagnetic Fields

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- April 2015 “Second CÉSAR LATTES Meeting”, Rio de Janeiro, Brazil
- July 2015 “Fourteenth Marcel Grossmann Meeting – MG14”, Rome, Italy
- July 2015 “Conference on Extremely High Intensity Laser Physics”

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

2014 List of Publication

Borja, Enrique F., Iñaki Garay, and Eckhard Strobel. "The Quantum Scalar Field in Spherically Symmetric Loop Quantum Gravity." *Progress in Mathematical Relativity, Gravitation and Cosmology*. Springer Berlin Heidelberg, 2014. 153-156.

Eckhard Strobel, and She-Sheng Xue. "Semiclassical pair production rate for time-dependent electrical fields with more than one component: -WKB-approach and world-line instantons" *Nuclear Physics B* 886 (2014): 1153.

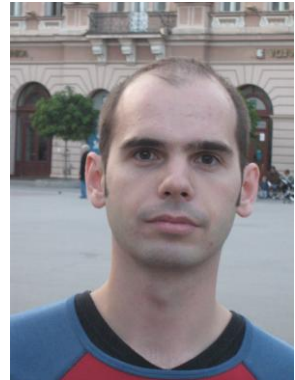
Strobel, Eckhard, and She-Sheng Xue. "Semiclassical pair production rate for rotating electric fields." *Physical Review D* 91.4 (2015): 045016.

Hagen Kleinert, Eckhard Strobel and She-Sheng Xue. "Fractional Effective Action at Strong Electromagnetic Fields." *Nonlinear Phenomena in Complex Systems* 17.4 (2015): 377-380.

Kovacevic Milos

Position: Erasmus Mundus Joint Doctorate student

Period covered: September 2013 – August 2016



I Scientific Work

Induced Gravitational Collapse paradigm

II Conferences and educational activities

EMJD school in Nice; September 2013, February 2014, September 2014

EMJD workshop in Les Houches, May 2014

1st Scientific ICRANet Meeting in Armenia

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...)*]

IV. Other

2015 List of Publication

- R. Ruffini, L. Izzo, M. Muccino, G.B. Pisani, J.A. Rueda, Y. Wang, C. Barbarino, C.L. Bianco, M. Enderli, M. Kovacevic - Induced gravitational collapse at extreme cosmological distances: the case of GRB090423 (A&A)
- R. Ruffini, M. Muccino, C.L. Bianco, M. Enderli, L. Izzo, M. Kovacevic, A.V. Penacchioni, G.B. Pisani, J.A. Rueda, Y. Wang - On Binary Driven Hypernovae and their nested late X-ray emission (A&A)
- M. Kovacevic, L. Izzo, Y. Wang, M. Muccino, M. Della Valle, L. Amati, C. Barbarino, M. Enderli, G. B. Pisani, L. Li - A search for Fermi bursts associated to supernovae and their frequency of occurrence (A&A)

Lisakov Sergey

Position: PhD student

Period covered: 1 Sept 2013 – 1 Sept 2016



I Scientific Work

Thesis: Core-collapse supernovae and their progenitors

All stars with an initial mass greater than 8 solar masses, but not massive enough to encounter the pair-production instability, eventually form a degenerate core and collapse to form a compact object, either a neutron star or a black hole. At the lower mass end, these massive stars die as red-supergiant stars and give rise to Type II supernovae (SNe). The diversity of observed properties of SNe II suggests a range of progenitor mass, radii, but also explosion energy.

We have performed a large grid simulations designed to cover this range of progenitor and explosion properties. Using MESA STAR, we compute a set of massive star models (12–30 solar masses) from the main sequence until core collapse. We then generate explosions with V1D to produce ejecta within a range of explosion energies and yields. Finally, all ejecta are evolved with CMFGEN to generate multi-band light curves and spectra.

In this work, we focus our attention on the properties of low-energy explosions that give rise to low-luminosity Type II Plateau (II-P) SNe. Such low-energy explosions, characterized by low ejecta expansion rates, are more suitable for reliable spectral line identifications. Based on our models, we discuss the distinct signatures of low-energy explosions in lower and higher mass models. One important goal is to identify whether there is a progenitor-mass bias leading to such events.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Erasmus Mundus Joint Doctorate Schools, 2–20 Sep 2013, Nice, France

Erasmus Mundus Joint Doctorate Schools, 12–16 Sep 2014, Les Houches, France

New windows on massive stars, 23–27 June 2014, Geneva, Switzerland

Supernovae in the local Universe: celebrating 10,000 days of supernova 1987A, 11–15 Aug 2014, Coffs Harbour, Australia

Erasmus Mundus Joint Doctorate Schools, 2–16 Sep 2014, Nice, France

Fourteenth Marcel Grossmann Meeting – MG14, 12–18 July 2015, Rome, Italy

IAU XXIX General Assembly, 3–14 Aug 2015, Hilo, USA

III. Service activities

III b. Outside ICRANet

MESA workshop, December 2013

Workshop given by L. Dessart and S. Lisakov for using MESA stellar evolution code.

List of Publication

Lisakov, Sergey M.; Dessart, Luc; Hillier, D. John; Waldman, Roni; Livne, Eli, «A study of low-energy type II supernovae», IAU General Assembly, vol. 22, p. 57009, 2015

Maiolino Tais

Position: Ph.D Student
Period covered: 2013-2016



I Scientific Work

Red-skewed Iron Lines in Accreting Compact Objects

Data Analysis of galactic compact objects

II Conferences and educational activities

II Conferences and Other External Scientific Work

- 2nd César Lattes Meeting, 13-22th April, Rio de Janeiro (Brazil)
- MG14 Rome, Fourteenth Marcel Grossmann Meeting, 12-18th July, 2015 - Roma (Italy)
- School of Astrostatistics 2015: Clustering and Classification, 11th June-16th July, 2015 - École de Physique des Houches (Les Houches - France)

2015 List of Publication

No publications

Sridhar Srivatsan

Position: PhD student

Period covered: November 2013 – November 2016



I Scientific Work

Statistical analysis of galaxy cluster distribution and cosmological constraints from the Euclid Wide Survey

II Conferences and educational activities

II a Conferences and Other External Scientific Work

| Title | Period | Duration |
|---|---|-------------------------|
| Erasmus Mundus school, Nice, France | Feb 23 rd to March 2 nd , 2014 | 1 week (Participant) |
| Euclid Consortium Meeting, Marseille, France | May 5 th to May 9 th , 2014 | 1 week (Participant) |
| Erasmus Mundus school, Les Houches, France | May 11 th to May 15 th , 2014 | 1 week (Participant) |
| Euclid OU-LE3 meeting, Paris, France | June 22 nd to June 27 th , 2014 | 1 week (Participant) |
| Cluster cosmology in the XXI century, Madrid, Spain | November 3 rd to November 8 th , 2014 | 1 week (Participant) |
| JDPN, Barcelonnette | March 23 rd to March 27 th , 2015 | 1 week (Presented work) |
| Euclid joint SWG-OULE3 Galaxy Clusters meeting, Bologna | May 5 th to May 8 th , 2015 | 1 week (Presented work) |

II b Work With Students

None

II c Diploma thesis supervision

None

II d Other Teaching Duties

None

II e. Work With Postdocs

None

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}

Was a full time volunteer at the Euclid OU-LE3 meeting held in Paris on the month of June 2014.

IV. Other

2014 List of Publication

Stahl Clément

Position: Erasmus Mundus PhD student
Period covered: 2015-present



I Scientific Work

Accelerated period of expansion of the Universe

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- 1) 10 February 2015: group seminar in Pescara: Magnetic fields in the sky
- 2) April 2015 : 2nd Cesar Lattes meeting, Rio. Talk: Pair creation in the early universe
- 3) 06 May 2015: ICRANet Lectures 2015, Lecturer: Fine tuning for life
- 4) July 2015 :Marcel Grossmann meeting. Talk:Pair creation in the early universe
- 5) July 2015: Italian Koreen meeting: Talk: Fractal matter distribution and supernovae IA
- 6) September 2015: Astrophysical Probes of Fundamental Physics: a PhD school in Ferrara, Talk: Fractal matter distribution and supernovae IA
- 7) October 2015: The information Universe, Groningen
- 8) 12 october 2015: Nordita High energy physics seminar, Stockholm, Talk: Fermionic pair creation and current in de Sitter spacetime

II b Work With Students

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

IV. Other

V. 2015 list of Publication :

Stahl C., Fractal matter distribution and supernovae, in preparation (2015)

Stahl C., Strobel E., Xue S-S, Fermionic current and Schwinger effect in de Sitter spacetime, submitted arXiv :1507.01686 [gr-qc]

Stahl, C., Strobel E., Semiclassical fermion pair creation in de Sitter spacetime, submitted arXiv :1507.01401 [hep-th]

Stahl C., Strobel E., Xue S-S, Pair Creation in the early universe, submitted (2015)

Yang Xiaofeng

Position: EMJD
Period covered: 2013-2016



I Scientific Work

A cosmological preferred direction was reported from the type Ia supernovae (SNe Ia) data in recent years. Most gamma-ray bursts have higher redshifts than SNe Ia. We use the long gamma-ray bursts data to give a simple classification of such studies for the first time. Because the maximum anisotropic direction is independent of isotropic cosmological models, we adopt two cosmological models for the hemisphere comparison analysis and LCDM model for dipole fit approach. In hemisphere comparison method, the matter density and the equation of state of dark energy are adopted as the diagnostic qualities in the LCDM model and wCDM model, respectively. In dipole fit approach, we fit the fluctuation of distance modulus. We find that there is a null signal for the hemisphere comparison method, while a preferred direction for the dipole fit method. This result indicates that the dipole fit is more sensitive than the hemisphere comparison method.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Testing the foundation of modern cosmology from astronomical data: SN Ia and GRB, Oct.5, 2015, ICRANet, Pescara, Italy

Testing the foundation of modern cosmology from astronomical data: using SN Ia and GRB to test the isotropy of cosmological principle (CP), 14th Italian-Korean Symposium on Relativistic Astrophysics, Jul.24, 2015, ICRANet, Pescara, Italy

Testing the cosmological principle of isotropy, Fourteenth Marcel Grossmann Meeting, Jul.13, 2015, U.Rome, Rome, Italy

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

2015 List of Publication

Searching for a preferred direction with Union2.1 data

Xiaofeng Yang, F. Y. Wang, Zhe Chu, Monthly Notices of the Royal Astronomical Society (MNRAS)
, Vol.437, Issue 2, 1840, 2014

Testing the cosmological principle of isotropy: Gamma-ray bursts

Xiaofeng Yang, et al, will submit to MNRAS

Aimuratov Yerlan

Position: EMJD IRAP PhD student (V cycle)
Period covered: January 2015 – December 2017



I Scientific Work

Gamma-Ray Bursts: Data Analysis and Theory

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- “Analysis of the GRB 081024B”
Talk and Proceeding to Marcel Grossmann Meeting XIV, 2015 July 12th-18th, Rome, Italy
Parallel session GB5-A: http://www.icra.it/mg/mg14/parallel_sessions.htm
- “GRB 081024B Analysis and Redshift Estimation”
Talk at 14th Italian-Korean Symposium on Relativistic Astrophysics, July 20th-24th, Pescara, Italy
http://icranet.org/index.php?option=com_content&task=view&id=935&Itemid=904#
- “Gamma-Ray Bursts within the Fireshell Model”
Seminar in Fessenkov Astrophysical Institute, 2015 August 5th, Almaty, Kazakhstan
<http://aphi.kz/seminar-by-yerlan-aimuratov.html>

II b Work With Students

None

II c Diploma thesis supervision

None

II d Other Teaching Duties

None

II e. Work With Postdocs

- Fireshell Model and analysis procedure for GRBs with RMFIT
with ICRANet Postdoc M. Muccino, February-December 2015

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

None

III b. Outside ICRANet
None

IV. Other

2014 List of Publication

- F. Rspayev, L. Kondratyeva, **Y. Aimuratov**. CH Cygni: new brightening in 2014 // IBVS, 6117, 1R, October 2014
- L. Kondratyeva, F. Rspayev, **Y. Aimuratov**. Ionization Structure of Nebula NGC 6857 // Astronomy Letters, Vol. 40, Issue 11, November 2014

2015 List of Publication

- L. Kondratyeva, F. Rspayev, **Y. Aimuratov**. New results on spectral and photometric variability of V806 Cassiopeiae // IBVS, 6141, 1R, April 2015

Chang Yu-Ling

Position: PhD student
Period covered: 2014-2017



I Scientific Work

Multi-frequency studies of blazars.

Properties of blazars and radio-loud AGNs.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

July 12 – July 18, 2015- Fourteenth Marcel Grossmann Meeting, Rome, Italy.

June 14 – June 19, 2015- IVOA Interoperability Woorkshop, Sesto, Italy.

2015 List of Publication

Chang, Y.-L.; Arsioli, B.; Giommi, P.; and Padovani, P. (in preparation)

Arsioli, B; Giommi, P; and Chang, Y.-L. (in preparation)

Padovani, P.; Giommi, P.; Resconi, E.; Arsioli, B.; Chang, Y.-L. (in preparation)

Delgado-Correal Camilo

Position: Erasmus Mundus PhD Student
Period covered: 2014-2017



I Scientific Work

low luminosity high redshift galaxies found in lensed fields by galaxy clusters

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Fourteenth Marcel Grossmann Meeting - MG14, Rome-Italy, July 12-18, 2015

Astrophysical Probes of Fundamental Physics - PhD School, Ferrara-Italy, 7-11 September 2015.

CLASH-VLT Meeting, Florence-Italy, 23-25 September 2015

The high-redshift Universe and the role of galaxies and AGN to cosmic reionization-PhD School, Bologna-Italy, 26-30 October 2015

The first Colombia-ICRANet Julio Garavito Armero Meeting, Bogota-Colombia, November 23-27 2015.

2015 List of Publication

Caminha GB; Grillo C; Rosati P; ...; D. Coe; **C. Delgado-Correal**; et al., "CLASH-VLT: A Highly Precise Strong Lensing Model of the Galaxy Cluster RX J2248.7–4431 (Abell 1063) and Prospects for Cosmography" , A&A, 2015, Submitted [SCI]

Efremov Pavel

Position: PhD Student
Period covered: 2014—2017



I Scientific Work

Relativistic Accretion onto Compact Objects

II Conferences and educational activities

II a Conferences and Other External Scientific Work

1. RTG “Models of Gravity”, Colloquium, Bielefeld, Germany (January, 14)
2. RTG “Models of Gravity”, Networking Workshop, University of Bremen, Germany (March, 2—5)
3. DPG Spring Meeting, Berlin, Germany (March, 15—20, 2015)
4. RTG “Models of Gravity”, Colloquium, ZARM, Uni Bremen, Germany (May, 13)
5. RTG “Models of Gravity”, Colloquium, Jacobs University, Bremen, Germany (June, 10)
6. RTG “Models of Gravity”, Colloquium, Uni Oldenburg, Germany (July, 1)
7. XIV Marcel Grossman Meeting, Sapienza, Rome Italy (July, 12—18)
8. 21st “Saalburg” Summer School, Wolfersdorf, Germany (August, 31 – September, 11)
9. RTG “Models of Gravity”, Networking Workshop, University of Bremen, Germany, (November, 9—11)

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

2014 List of Publication

Jefremov, P., Tsupko O., Bisnovatyi-Kogan G., Phys. Rev. D 91, 124030 (2015)

DOI: 10.1103/PhysRevD.91.124030

<http://arxiv.org/abs/1503.07060>

Karlica Mile

Position: EMJD PhD student
Period covered: 2014 - now



I Scientific Work

Development of numerical codes for solving the kinetic equation and calculation of non-thermal spectra with the special interest to GRB afterglow. In this past year we constructed the paradigm of “sponge” model which includes the influence of ejecta fragmentation on the form of GRB afterglow lightcurve.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- 2nd Cesar Lattes Meeting, Rio de Janeiro, Brazil, April 13-22, 2015
- Fourteenth Marcel Grossmann Meeting, Rome, Italy, July 12-18, 2015

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

- Talk at 2nd Cesar Lattes Meeting, Rio de Janeiro, Brazil, April 13-22, 2015 with the title: Synchrotron Radiation and GRB Perspective – A Short Review
- Talk at Fourteenth Marcel Grossmann Meeting, Rome, Italy, July 12-18, 2015 with the title: “Sponge Model” As The Hydrodynamical Background For GRB Afterglow Phase

III b. Outside ICRANet

IV. Other

2015 List of Publication

- Dumbović, M., Vršnak, B., Čalogović, J., Karlica, M. (2011). ‘Cosmic ray modulation by solar wind disturbances’. *Astronomy and astrophysics*, 531, A91-1-A91-17.

Krut Andreas

Position: PhD (EMJD)
Period covered: 3 years



I Scientific Work

Dark matter and galaxy structures

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- *Third Bego Rencontres, IRAP Ph.D. Erasmus Mundus school (September 8-19, 2014)*
- *2nd César Lattes Meeting (April 13-22, 2015)*
- *14th Marcel Grossmann Meeting (July 12-18, 2015)*
- *14th Italian-Korean Symposium on Relativistic Astrophysics (July 20-24, 2015)*
- *Astrophysical Probes of Fundamental Physics, A PhD School at University of Ferrara (September 7-11, 2015)*

II b Work With Students - none

II c Diploma thesis supervision - none

II d Other Teaching Duties - none

II e. Work With Postdocs - none

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

2015 List of Publication

No, yet

Martinez Aviles Gerardo

Position: PhD Student in Relativistic Astrophysics
Period covered: September 2014- November 2015



I Scientific Work

I am currently working on radio observations of galaxy clusters, with the main aim of detecting synchrotron radiation from the largest scale structures of the Universe. In my first PhD year, I have been able to learn the basis of radio-interferometry and of data reduction, finalizing in a few months the analysis of 7 big data sets. I am now working on my first publication on this topic.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

| | |
|------------------|---|
| October 2015 | Exoplanetary atmospheres and habitability, Nice, France |
| September 2015 | Sixth European Radio Interferometry School ERIS 2015, Garching, Germany |
| June-August 2015 | Research visit in Victoria University, Wellington, New Zealand |
| January 2015 | Research visit in Victoria University, Wellington, New Zealand |
| November 2014 | 3 rd LOFAR Data processing school, Dwingeloo, Netherlands |

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

Organization of scientific meetings with PhD students and Postdocs in Observatoire de la cote d'azur.

IV. Other

2015 List of Publication

CAPES

Brandt Carlos Henrique

Position: PhD student
Period covered: 2015



I Scientific Work

The Stripe82 data collection started to be analyzed. We have collected data from all different wavelengths to build up a deep database of medium sky area survey. Data from the major survey/missions, SDSS, CS82, Stripe82X, SpIES, GALEX can be seen at the vo service at vo.bsdicranet.org. Matching these data with SDSS spectrographic redshift provides a dataset being used for photometric redshift estimation. This work is being carried in collaboration with professor Martin Makler, from CBPF, Brazil, using the ANNZ code. This study is under active development, where, after cleaning and filtering the photometric data we are now understanding the subtleties of machine learning algorithms for classification and regression purposes.

II Conferences and educational activities

II a

6th AstroInformatics meeting, 5-9 October, Dubrovnik, Croatia
XIV Marcel Grossmann meeting, 12-18 July, Rome, Italy
IVOA Interoperability meeting, 15-19 June, Sesto, Italy

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

Efforts have been done to setup a website for the Brazilian Science Data Center, in Pescara, but short on human resources are a major obstacle for the project. By all means, I am being able to maintain an interface for data access using VO protocols and web services accessible at <http://vo.bsdicranet.org>.

III b. Outside ICRANet

Using publicly available services we can find a small set of software projects I have being maintaining mainly focusing on VO data providing/access and cloud computing. The underlying common aim of those projects is to provide a platform independent setup for complex/intensive astronomical software. The projects can be found at <https://github.com/chbrandt>.

IV. Other

2015 List of Publication

“Mediatrix method for object filamentation: application to gravitational arcs”, Bom C.R, Makler M., Albuquerque M.P., Brandt C.H., Ferreira P.C., Astronomy and Astrophysics, in preparation

Position: Ph.D Student

Period covered: February 2014 – January 2017



I Scientific Work

-Bachelor Degree in Mathematics, Federal University of Pernambuco (UFPE), 2008 to 2010.

-Master Degree in Mathematics, Federal University of Pernambuco (UFPE), 2011 to 2013.

Masters Dissertation title (translated from Portuguese): “The Ricci flow and Hamilton's theorem”.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- IRAP Ph.D Erasmus Mundus Winter School of Nice (France), February of 2014;

- Zel'dovich – 100 Meeting, Minsk (Belarus), March of 2014;

- École de Physique des Houches (France), May 2014;

- First Scientific ICRANet Meeting in Armenia, June-July of 2014;

- IRAP Ph.D IRAP Ph.D Erasmus Mundus School of Nice (France), September of 2014;

- Fourteenth Marcel Grossmann Meeting , July 2015;

II b Work With Students

- “On the disformal invariance of the Dirac equation” , joint work with Eduardo Bittencourt (Postdoc) and Iarley Pereira (Ph.D).

II c Diploma thesis supervision

II d Other Teaching Duties

-Former Temporary Professor at the Federal University of Pernambuco.

II e. Work With Postdocs

- “On the disformal invariance of the Dirac equation” , joint work with Eduardo Bittencourt (Postdoc) and Iarley Pereira (Ph.D).

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

IV. Other2015 List of Publication

- “On the disformal invariance of the Dirac equation” (Classical & Quantum Gravity v. 32, p. 185016, 2015.)

Position: CAPES-ICRANet Ph.D. Student
Period covered: 2015



I Scientific Work

I investigate geometrical properties of models used to describe the phenomenology of quantum-gravity. In particular, the role of Planck-scale-dependent deformed kinematics in Special Relativity (named DSR) and it's generalization towards possible deformations of General Relativity; I also study the possibility of curved momentum spaces in such paradigm.

Another topic of interest is the use of non-riemannian geometries for the description of alternatives theories of gravity.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

June: **The 9th Alexander Friedmann International Seminar on Gravitation and Cosmology and the 3rd Satellite Symposium on the Casimir Effect**, St. Petersburg, Russia.

I presented a talk named “Peculiar properties of 3D gravity, the Magueijo-Smolín model and other DSR-relativistic pictures with anti-de Sitter momentum space”.

2) July: **Fourteenth Marcel Grossman Meeting on General Relativity**, Rome, Italy.

I presented a talk named “Geometric picture of DSR-relativistic theories with de Sitter and anti-de Sitter momentum spaces”.

3) July: **Quantum Gravity Meeting**, Rome, Italy.

I presented a talk named “Geometric picture of DSR-relativistic theories with de Sitter and anti-de Sitter momentum spaces”.

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

2015 List of Publication

E. Bittencourt, I. P. Lobo and G. G. Carvalho, *Class. Quantum Grav.* **32** 185016 (2015).

I. P. Lobo, A. B. Barreto and C. Romero, *Eur. Phys. J. C* **75** 448 (2015).

I. P. Lobo and G. Palmisano, *Geometric interpretation of Planck-scale-deformed co-products*, accepted for publication in *Int. J. Mod. Phys. Conf. Series*.

G. G. Carvalho, I. P. Lobo and E. Bittencourt, arXiv: 1511.00495.

Bisnovatyι-Kogan Gennady

Position: Main Scientific Researcher, Space
Research Institute RAS, Moscow, Russia
Period covered: 1995 - present time



I Scientific Work

Theory: X-ray sources. Dark energy in galactic clusters. Magnetorotational supernovae.

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 Lecture course: “**Accretion disks in close binary systems**” for gradient students in the University Santa Catarina, Florianopolis, Brazil; June 1- July 10, 2015.

III b. Outside ICRANet

IV. Other

2015 List of Publication

1. Strong Shock in a Uniformly Expanding Universe
G. S. Bisnovatyι-Kogan*

Space Research Institute, RAS, Profsoyuznaya 84/32, Moscow 117997, Russia;

*National Research Nuclear University MEPhI, Moscow, Russia;
ICRANet, CBPF, Rio de Janeiro, Brazil*

Gravitation and Cosmology, 2015, Vol. 21, No. 3, pp. 236–240.

2. Outer Parts of Large Galactic Clusters in the Presence of Dark Energy

G. S. Bisnovatyi-Kogan

Astronomy Reports, 2015, Vol. 59, No. 6, pp. 430–440.

3. Optical and X-ray Behavior of the High Mass X-ray Transient

A0535+26/HDE245770 in 2014

F. Giovannelli , G.S. Bisnovatyi-Kogan , I. Bruni , G. Corfini , F. Martinelli and C. Rossi

ACTA ASTRONOMICA Vol. 65 (2015) pp. 107–116

4. Period Clustering of Anomalous X-Ray Pulsars

G. S. Bisnovatyi-Kogan and N. R. Ikhsanov

Astronomy Reports, 2015, Vol. 59, No. 6, pp. 503–509

5. Innermost stable circular orbits of spinning test particles in Schwarzschild and Kerr space-times

Paul I. Jefremov, Oleg Yu. Tsupko, and Gennady S. Bisnovatyi-Kogan

Physical Review D, D 91, 124030 (2015)

**6. Development of the Magneto-Differential-Rotational Instability
in Magnetorotational Supernova***

S. G. Moiseenko and G. S. Bisnovatyi-Kogan

Astronomy Reports, 2015, Vol. 59, No. 7, pp. 573–580.



Position: Director of ASI Science Data Center

Period covered: 1 January – 10 November 2015

I Scientific Work

Research in multi-frequency multi-messenger astrophysics, mostly in the field of AGN and Blazars. Over the past year I have been particularly active in high-energy (100MeV-10TeV) astrophysics, correlations between blazars, neutrinos and Ultra High Energy Cosmic Rays (UHECRs)

Development of new techniques (e.g. ASDC SED tool) for the analysis of large amounts of archival data, including published results.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

“2nd Latter Meeting, Rio de Janeiro . Invited talk

14th Marcel Grossman meeting – Roma . Plenary Talk

TeV Particle Astrophysics 2015 – Tokyo. Invited Plenary Talk

II c Diploma thesis supervision of Yu-Ling Chen and Carlos Brandt, Supervision of research work of Bruno Arsioli and (partly) Bernardo Fraga (CAPES post-docs)

III. Service activities *Director of ASI Science Data Center*

III a. Within ICRANet.

Definition and first implementation of the Brazilian Science Data Center.

2015 List of Publications

1. 2015MNRAS.446.4078K

New white dwarf stars in the Sloan Digital Sky Survey Data Release 10

Kepler, S. O.; Pelisoli, I.; Koester, D.; Ourique, G.; Kleinman, S. J.; Romero, A. D.; Nitta, A.; Eisenstein, D. J.; Costa, J. E. S.; Külebi, B.; Jordan, S.; Dufour, P.; Giommi, Paolo; Rebassa-Mansergas, Alberto

2. 2015MNRAS446L,41

A simplified view of blazars: the very high energy gamma-ray vision

Padovani, P.; Giommi, P.

3. 2015Ap&SS.357...75M

The 5th edition of the Roma-BZCAT.

Massaro, E.; Maselli, A.; Leto, C.; Marchegiani, P.; Perri, M.; Giommi, P.; Piranomonte, S.

4. [2015Sci...348..670B](#)

Boggs, S. E.; Harrison, F. A.; Miyasaka, H.; Grefenstette, B. W.; Zoglauer, A.; Fryer, C. L.; Reynolds, S. P.; Alexander, D. M.; An, H.; Barret, D.; Christensen, F. E.; Craig, W. W.; Forster, K.; Giommi, P.; Hailey, C. J.; Hornstrup, A.; Kitaguchi, T.; Koglin, J. E.; Madsen, K. K.; Mao, P. H.; Mori, K.; Perri, M.; Pivovarov, M. J.; Puccetti, S.; Rana, V.; Stern, D.; Westergaard, N. J.; Zhang, W. W.

5. [2015ApJS..218...23A](#)

*Fermi Large Area Telescope Third Source Catalog
As part of the Fermi collaboration*

6. [2015MNRAS.449.3517D](#)

Are many radio-selected BL Lacs radio quasars in disguise?
[D'Elia, V.](#); [Padovani, P.](#); [Giommi, P.](#); [Turriziani, S.](#)

7. [2015Ac&A...579A..34A](#)

1WHSP: An IR-based sample of ~ 1000 VHE γ -ray blazar candidates
[Arsioli, B.](#); [Fraga, B.](#); [Giommi, P.](#); [Padovani, P.](#); [Marrese, P. M.](#)

8. [2015ApJ...807...79H](#)

Rapid Variability of Blazar 3C 279 during Flaring States in 2013-2014 with Joint Fermi-LAT, NuSTAR, Swift, and Ground-Based Multiwavelength Observations
[Hayashida, M.](#); [Nalewajko, K.](#); [Madejski, G. M.](#); [Sikora, M.](#); [Itob, R.](#); [Ajello, M.](#); [Blandford, R. D.](#); [Buson, S.](#); [Chiang, J.](#); [Fukazawa, Y.](#); [Furniss, A. K.](#); [Urry, C. M.](#); [Hasan, I.](#); [Harrison, F. A.](#); [Alexander, D. M.](#); [Baloković, M.](#); [Barret, D.](#); [Boggs, S. E.](#); [Christensen, F. E.](#); [Craig, W. W.](#); [Forster, K.](#); [Giommi, P.](#); [Grefenstette, B.](#); [Hailey, C.](#); [Hornstrup, A.](#); [Kitaguchi, T.](#); [Koglin, J. E.](#); [Madsen, K. K.](#); [Mao, P. H.](#); [Miyasaka, H.](#); [Mori, K.](#); [Perri, M.](#); [Pivovarov, M. J.](#); [Puccetti, S.](#); [Rana, V.](#); [Stern, D.](#); [Tagliaferri, G.](#); [Westergaard, N. J.](#); [Zhang, W. W.](#); [Zoglauer, A.](#); [Gurvell, M. A.](#); [Uemura, M.](#); [Akitaya, H.](#); [Kawabata, K. S.](#); [Kawaguchi, K.](#); [Kanda, Y.](#); [Moritani, Y.](#); [Takaki, K.](#); [Ui, T.](#); [Yoshida, M.](#); [Agarwal, A.](#); [Gupta, A. C.](#)

9. [2015MNRAS.450.2404G](#)

A simplified view of blazars: contribution to the X-ray and γ -ray extragalactic backgrounds
[Giommi, P.](#); [Padovani, P.](#)

10. [2015arXiv150805894C](#)

CTA Contributions to the 34th International Cosmic Ray Conference (ICRC2015)

11. [2015ApJ...810...14A](#)

The Third Catalog of Active Galactic Nuclei Detected by the Fermi Large Area Telescope
Fermi collaboration

12. [2015arXiv150902063T](#)

Multiwavelength Evidence for Quasi-periodic Modulation in the Gamma-ray Blazar PG 1553+113
Fermi collaboration

13. [2015JHEAp...7..173G](#)

Multi-frequency, multi-messenger astrophysics with Swift. The case of blazars
[P. Giommi](#)

14. [2015MNRAS.452.1877P](#)

A simplified view of blazars: the neutrino background

Padovani, P.; Petropoulou, M.; Giommi, P.; Resconi, E.

15. [2015ApJ...812...65F](#)

First NuSTAR Observations of Mrk 501 within a Radio to TeV Multi-Instrument Campaign

NuSTAR+MAGIC+VERITAS collaborations

16. [2015arXiv151004631M](#)

NuSTAR Hard X-ray Survey of the Galactic Center Region I: Hard X-ray Morphology and Spectroscopy of the Diffuse Emission

Mori, Kaya; Hailey, Charles J.; Krivonos, Roman; Hong, Jaesub; Ponti, Gabriele; Bauer, Franz; Perez, Kerstin; Nynka, Melania; Zhang, Shuo; Tomsick, John A.; Alexander, David M.; Baganoff, Frederick K.; Barret, Didier; Barriere, Nicolas; Boggs, Steven E.; Canipe, Alicia M.; Christensen, Finn E.; Craig, William W.; Forster, Karl; Giommi, Paolo; Grefenstette, Brian W.; Grindlay, Jonathan E.; Harrison, Fiona A.; Hornstrup, Allan; Kitaguchi, Takao; Koglin, Jason E.; Luu, Vy; Madsen, Kristen K.; Mao, Peter H.; Miyasaka, Hiromasa; Perri, Matteo; Pivovarov, Michael J.; Puccetti, Simonetta; Rana, Vikram; Stern, Daniel; Westergaard, Niels J.; Zhang, William W.; Zoglauer, Andreas

17. [2015arXiv151008358K](#)

X-Ray Polarimetry with the Polarization Spectroscopic Telescope Array (PoSTAR)

Krawczynski, Henric S.; Stern, Daniel; Harrison, Fiona A.; Kislat, Fabian F.; Zajczyk, Anna; Beilicke, Matthias; Hoormann, Janie; Guo, Qingzhen; Endsley, Ryan; Ingram, Adam R.; Miyasaka, Hiromasa; Madsen, Kristin K.; Aaron, Kim M.; Aminia, Rashied; Baring, Matthew G.; Beheshti-pour, Banafsheh; Bodaghee, Arash; Booth, Jeffrey; Borden, Chester; Boettcher, Markus; Christensen, Finn E.; Coppi, Paolo S.; Cowsik, Ramanath; Davis, Shane; Dexter, Jason; Done, Chris; Dominguez, Luis A.; Ellison, Don; English, Robin J.; Fabian, Andrew C.; Falcone, Abe; Farretto, Jeffrey A.; Fernandez, Rodrigo; Giommi, Paolo; Grefenstette, Brian W.; Kara, Erin; Lee, Chung H.; Lyutikov, Maxim; Maccarone, Thomas; Matsumoto, Hironori; McKinney, Jonathan; Mibara, Tatehiro; Miller, Jon M.; Narayan, Ramesh; Natalucci, Lorenzo; Oezel, Feryal; Pivovarov, Michael J.; Prado, Steven; Psaltis, Dimitrios; Okajima, Takashi; Toma, Kenji; Zhang, William W.

18. *Proceedings of 2nd Lattes meeting*

Multi-frequency multi-messenger astrophysics with blazars at ASDC and BSDC

Paolo Giommi

Rangel Lemos Luis Juracy

Position: AII Adjunct Professor of the Federal
University of Tocantins
Period covered: 2014-15



I Scientific Work

II Conferences and educational activities

II a Conferences and Other External Scientific Work

L. J. Rangel Lemos, C. L. Bianco, R. Ruffini; "Applying the luminosity function statistics in the fireshell model"; proceeding of the "The 2nd ICRANet César Lattes Meeting"; it will be published by American Institute of Physics (AIP), 2015.

II b Work With Students

L. J. RANGEL LEMOS, E. SALES; "Astrofísica Relativística, um panorama sobre os eventos mais energéticos do universo"; In: *I Semana Acadêmica da Física da UFT, 2015, ARAGUAINA. Divulgação Conhecimento da Física. Nagô Editora; v. 1. p. 100-117, 2015. (ISBN: 978-85-64147-36-2)*

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

participation of the 2nd ICRANet César Lattes Meeting, Rio de Janeiro, 13-18 april 2015.

III b. Outside ICRANet

Participation of Conferences:

- XXXIII Encontro de Física do Norte e Nordeste (XXXIII EFNNE), 11-13 november 2015, Natal-RN-Brazil.

- participation and member of the organizing committee of the II Encontro de Física do Entorno do Bico do Papagaio (II ENFEBP), 18-20 november 2015, Araguaína-TO-Brazil.

Teaching courses in the Federal University of Tocantins:

- Fundamentos de Física Mecânica (60 hours)

- Cálculo de Várias Variáveis (60 hours)

IV. Other

2015 List of Publication

Zen Vasconcellos Cesar Augusto

Position:

- Full Professor, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil
- Adjunct Professor, ICRANet, Italy

Period covered: 2015



I Scientific Work

Research on Nuclear Astrophysics, with application in the description of the structure of neutron stars and pulsars.

II Conferences and educational activities

II a Conferences and Other External Scientific Work:

Chair of the following conferences:

- STARS2015 - 3rd Caribbean Symposium on Cosmology, Gravitation, Nuclear and Astroparticle Physics, Havana, Cuba, May 10-13, 2015
- SMFNS2015 - 4th International Symposium on Strong Electromagnetic Fields and Neutron Stars, Varadero, Cuba, May 13-16, 2015

Co-Chair of the following conferences:

- The Second ICRANet César Lattes Meeting, Niterói - Rio De Janeiro, April 13-18, 2015 - João Pessoa, April 21, 2015 - Recife - Fortaleza, April 22, 2015.

- Maurice Bazin Caribbean Conference on Relativistic Astrophysics, Havana, Cuba, May 13, 2015

Member of Organizing Committee of the following meeting:

- Fourteenth Marcel Grossmann Meeting - MG14, University of Rome "La Sapienza" - Rome, July 12-18, 2015

II b Work With Students

II c Diploma thesis supervision:

Adviser of PhD of the following students:

- Rosana de Oliveira Gomes, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil
- Alberto Sperotto dos Santos Rocha, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

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

2015 List of Publication:

- MANY-BODY FORCES IN THE EQUATION OF STATE OF HYPERONIC MATTER, R. O. Gomes, V. Dexheimer, S. Schramm, and C. A. Z. Vasconcellos - Published 2015 July 14 • © 2015. The American Astronomical Society. All rights reserved. • The Astrophysical Journal, Volume 808, Number 1, 8, 21 p.
- Z DECAY AND DARK MATTER RELIC DENSITY IN A STUECKELBERG EXTENSION OF THE STANDARD MODEL, A. L. dos Santos and C. A. Z. Vasconcellos - Astron. Nachr. /AN 336, No. 8/9, 900 – 904 (2015)/ DOI 10.1002/asna.201512246
- AN EFFECTIVE FIELD THEORY FOR NEUTRON STARS WITH MANY-BODY FORCES, STRONG Σ^- REPULSION, AND K^- AND \bar{K}^0 CONDENSATION, A. Mesquita, M. Razeira, R. Ruffini, J. A. Rueda, D. Hadjimichef, R. O. Gomes, and C. A. Zen Vasconcellos - Astron. Nachr. /AN 336, No. 8/9, 880 – 884 (2015)/ DOI 10.1002/asna.201512242
- A REVIEW ON THE RELATIVISTIC EFFECTIVE FIELD THEORY WITH PARAMETERIZED COUPLINGS FOR NUCLEAR MATTER AND NEUTRON STARS, C. A. Zen Vasconcellos – AIP Journal, 2015 (to be published)

Bartosch Caminha Gabriel

Position: Post-Doc

Period covered: 01/01/2015 – 25/11/2015



I Scientific Work

My research activities are focused in probing the total mass distribution in Galaxy Clusters using Strong Lensing techniques in combination with the outstanding data of these surveys.

My main interests are to study the nature of the dark components of the Universe, i.e. dark matter and dark energy, and how its properties impact on the evolution and formation of galaxies and cluster galaxies.

I am also member and collaborator of the SOAR Gravitational Arc Survey (SOGRAS), the CFHT/MegaCam Stripe-82 Survey (CS82) and the Strong Lensing Working Group of the Dark Energy Survey (DES).

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Fourteenth Marcel Grossmann Meeting

6th Young Researcher Meeting

CLASH-VLT Meeting in Arcetri

II b Work With Students

Camilo Delgado-Correal

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

IV. Other

2015 List of Publication

Caminha, et al., CLASH-VLT: A highly precise strong lensing model of the galaxy cluster RXC~J2248.7-4431 (Abell S1063) and prospects for cosmography, submitted to A&A

Grillo, et al., The story of supernova 'Refsdal' told by MUSE, submitted to ApJ

<http://adsabs.harvard.edu/abs/2015arXiv151104093G>

Balestra et al., CLASH-VLT: Dissecting the Frontier Fields Galaxy Cluster MACS J0416.1-2403 with ~800 Spectra of Member Galaxies, submitted to ApJ

<http://adsabs.harvard.edu/abs/2015arXiv151102522B>

Treu et al. 'Refsdal' meets Popper: comparing predictions of the re-appearance of the multiply imaged supernova behind MACS1149.5+2223, submitted to ApJ

<http://adsabs.harvard.edu/abs/2015arXiv151005750T>

Annunziatella, M. et al., CLASH-VLT: Environment-driven evolution of galaxies in the $z=0.209$ cluster Abell 209, A&A in press.

<http://adsabs.harvard.edu/abs/2015arXiv151005659A>

Girardi, M. et al. CLASH-VLT: Substructure in the galaxy cluster MACS J1206.2-0847 from kinematics of galaxy populations, A&A, 579, A4

<http://adsabs.harvard.edu/abs/2015A%26A...579A...4G>

Goulart Coelho Jaziel

Position: Postdoc
Period covered: 2014-2015



I Scientific Work

Compact objects: SGRs/AXPs, white dwarfs and neutron stars

Work With Students (ICRANet):

Thermal X-ray emission from massive, fast rotating, highly magnetized white dwarfs

Diego L. Cáceres, Jaziel G. Coelho, S. M. de Carvalho, R. C. R. de Lima , Jorge A. Rueda , Remo Ruffini

Work With Postdocs:

On the rotation-power nature of SGRs and AXPs

Jaziel G. Coelho, R. C. R. de Lima, Diego L. Cáceres, M. Malheiro, Jorge A. Rueda , Remo Ruffini

2015 List of Publication

Particle acceleration and radio emission for SGRs/AXPs as white dwarf pulsars. Journal of Physics. Conference Series (Online), v. 630, p. 012015, 2015.

Lobato, R. V. ; Coelho, Jaziel ; Malheiro, M.

Fermionic matter under the effects of high magnetic fields and its consequences in white dwarfs. Journal of Physics. Conference Series (Print), v. 630, p. 012039, 2015.

Otoniel, E.; Malheiro, M ; Coelho, J. G.

Do SGRs/AXPs and radio AXPs have the same nature? In: Proceedings of the MG13 Meeting on General Relativity, 2015, Stockholm University. The Thirteenth Marcel Grossmann Meeting. p. 2465-2467.

Coelho, J. and Malheiro, M.

Magnetic fields of SGRs/AXPs as rotation-powered massive white dwarfs. In: Proceedings of the MG13 Meeting on General Relativity, 2015, Stockholm University. The Thirteenth Marcel Grossmann Meeting. p. 2462-2464.

Malheiro, M. and Coelho, J.

Thermal X-ray emission from massive, fast rotating, highly magnetized white dwarfs – (ready for submission to ApJ)

Diego L. Cáceres, Jaziel G. Coelho, S. M. de Carvalho, R. C. R. de Lima, Jorge A. Rueda, Remo Ruffini

On the rotation-power nature of SGRs and AXPs – (submitted to ApJ)

Jaziel G. Coelho, R. C. R. de Lima, Diego L. Cáceres, M. Malheiro, Jorge A. Rueda, Remo Ruffini

Bittencourt Eduardo

Position: Postdoc

Period covered: January – November 2014



I Scientific Work

1. Mathematical aspects of gravitational theories;
2. Geometric Scalar Theory of Gravity and possible generalizations;
3. Disformal transformations of dynamical field equations;
4. Cosmological models with viscosity and perturbation theory;
5. Analogue models of gravity;

II Conferences and educational activities

II a Conferences and Other External Scientific Work

1. 6th Young Researcher Meeting (L'Aquila)
2. GR100 in Rio (Rio de Janeiro)
3. Marcel Grossmann (Rome)
4. Einstein's Legacy (London)

II b Work With Students

Gabriel G. Carvalho and Iarley P. Lobo (CAPES)

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

Grasiele B. Santos (CAPES), Jonas P. Pereira and Andrea Geralico (ICRANet)

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

2015 List of Publication

1. Donato Bini, Eduardo Bittencourt and Andrea Geralico, *Massless Dirac particles in the vacuum C-metric*, Class. Quantum Grav. **32** (2015) 215010.
2. Donato Bini, Eduardo Bittencourt, Andrea Geralico and Robert T. Jantzen, *Slicing black hole spacetimes*, Int. J. Geom. Meth. Mod. Phys., **12** (2015) 1550070.
3. Eduardo Bittencourt, Iarley P. Lobo and Gabriel G. Carvalho, *On the disformal invariance of the Dirac equation*, Class. Quantum Grav. **32** (2015) 185016.
4. G.B. Santos, E. Bittencourt and J.M. Salim, *Scalar perturbations in a Friedmann-like metric with non-null Weyl tensor*, JCAP **06** (2015) 013.
5. Mario Novello and Eduardo Bittencourt, *Metric Relativity and the Dynamical Bridge: Highlights of Riemannian Geometry in Physics*, Braz. J. Phys. **45** (2015) 756.

C. R. De Lima Rafael

Position: PostDoc
Period covered: 2015



I Scientific Work

Compact objects: SGRs/AXPs, white dwarfs and neutron stars. Analysis of Equations of State for compact stars. Analysis of pulsed fractions due to hot spots in compact stars.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

“Effect of strong magnetic fields on the nuclear pasta phase structure”, The Structure and Signals of Neutron Stars, from Birth to Death, 24-28 March, 2014, Florence, Italy

“Non-homogeneous nuclear phases under strong magnetic fields “ - 1 st Scientific ICRANet Meeting in Armenia: Black Holes: the largest energy sources in the Universe, 30 June - 4 July 2014 – Yerevan (Armenia)

“Final stages of binary progenitors of short gamma ray bursts”, OLIVEIRA, F. G. ; DE LIMA, R. C. R. ; RUEDA, J. A. ; RUFFINI, R., Fourteenth Marcel Grossmann Meeting, University of Rome "La Sapienza" - Rome, July 12-18, 2015

“Analysis of the Properties of SGRs and AXPs with Realistic Neutron Star Configurations”, Lima, R. C. R. ; Coelho, J. G. ; Rueda, J. A. ; Malheiro, M. ; Ruffini, R., The Second ICRANet César Lattes Meeting, Niterói, Rio De Janeiro, April 13-18, 2015

“SGRs and AXPs as rotation-powered compact stars”, Lima, R. C. R. ; Coelho, J. G. ; Rueda, J. A. ; Malheiro, M. ; Ruffini, R., Fourteenth Marcel Grossmann Meeting, University of Rome "La Sapienza" – Rome, July 12-18, 2015

II d Other Teaching Duties

“Slowly rotating relativistic neutron stars” - Third Bego Rencontres - IRAP Ph.D. Erasmus Mundus school - September 8th-19th, 2014

II e. Work With Postdocs

“Thermal x-ray emission from massive, fast rotating, highly magnetized white dwarfs” -D. L. Caceres, J. G. Coelho, S. M. de Carvalho, R. C. R. de Lima, J. A. Rueda, R. Ruffini – 2015; submitted

“On the rotation-power nature of SGRs and AXPs”, , J. G. Coelho, R. C. R. de Lima, D. L. Cáceres ,M. Malheiro, J. A. Rueda, R. Ruffini – 2015; submitted

“On the accuracy of the slow-rotation approximation in the description of neutron stars”, R. C. R. de Lima, F. Cipolletta, J. A. Rueda, R. Ruffini; to be submitted.

“CXOU J1647: canonical white dwarf and neutron star versus magnetar”, D. L. Cáceres, ”, R. C. R. de Lima, J. G. Coelho, J. A. Rueda, R. Ruffini;to be submitted.

Batista dos Santos Grasielle

Position: Post doctoral fellow

Period covered: 2015



I Scientific Work

1. Quantum gravity phenomenology in cosmology;
2. Classical cosmological perturbation theory;
3. Cosmological models with viscosity;

II Conferences and educational activities

II a Conferences and Other External Scientific Work

1. XIV Marcel Grossmann Meeting (Rome)
2. Quantum Gravity Meeting (Rome)
3. Hot topics in general relativity and gravitation (Vietnam)
4. Einstein's Legacy (London)

II b Work With Students

Francesco Brighenti (PhD student, Università di Bologna)

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

Eduardo Bittencourt (CAPES) and Giulia Gubitosi (INFN and Imperial College)

III. Service activities

III a. Within ICRANet

IV. Other

2015 List of Publication

1. G.B. Santos, E. Bittencourt and J.M. Salim, *Scalar perturbations in a Friedmann-like metric with non-null Weyl tensor*, JCAP **06** (2015) 013.
2. Grasiela Santos, Giulia Gubitosi and Giovanni Amelino-Camelia, *On the initial singularity problem in rainbow cosmology*, JCAP **08** (2015) 005.

Belvedere Riccardo

Position: Post Doc

Period covered: April 2014 - Present



I Scientific Work

I am collaborating with Professor Remo Ruffini and Dr. Rueda to analyze the astrophysical consequences of our new model of neutron stars, in particular focusing on its effect on the Kerr quadrupole moment and the creation of a black hole. At the same time I am working with Professor Sergio Barbosa Duarte, from CBPF, to introduce more degrees of freedom in our neutron stars model, taking into account the Delta-Resonances in the Walecka and Zimanyi-Moszkowski models. With Professor Rodrigo Picanço Negreiros, from UFF (Universidade Federal Fluminense), I am applying the cooling to our model of neutron stars, being it, until now, developed in the $T=0$ limit.

II Conferences and educational activities

- The Second ICRANet César Lattes Meeting, Niteroi – Rio de Janeiro, Brazil, April, 13-18, 2015
- Fourteenth Marcel Grossmann Meeting – MG14 – University of Rome “La Sapienza” - Rome, July, 12-18, 2015.

2015 List of Publication

- R. Belvedere, J. A. Rueda, and R. Ruffini,
“On the Magnetic Field of Pulsars with Realistic Neutron Star Configurations”.
Astrophys. J., 799, 23, (2015)
- R. Belvedere, J. A. Rueda, and R. Ruffini,
“Suitability of Analytical Formulas for the Determination of the Neutron Star Keplerian Frequency and Moment of Inertia”.
Submitted to *Phys. Rev. C*



Position: Post-doc

Period covered: 01/01/2014 to 31/12/2015

I Scientific Work

My post-doc research concentrated on the development of the space experiment MIRAX (Monitor e Imageador de RAios X), and a balloon-borne coded-mask experiment, protoMIRAX, that will serve as a prototype for testing the detectors and instrumentation in general. The energy range covered by the detectors is 10-200 keV for MIRAX and 30-200 keV for protoMIRAX. The detectors are 169 in total, distributed in a plane, in a 13 x 13 array. The experiment uses a coded mask with a MURA pattern (Uniformly Redundant Array) which is a 2 x 2 extension of the 13 x 13 pattern, minus one line and one column (25 x 25).

My work was to characterize and calibrate the X-ray detectors. I developed a program in order to acquire and analyze the data. The main astrophysical sources that will be observed by MIRAX are the Crab Nebula and three sources in the Galactic Centre region. I also helped to simulate the diffuse background and to reconstruct the images of the sources as will be seen by MIRAX. To do this we made use of the GEANT4 package, developed by CERN. The aim was to simulate every interaction of the incoming particles with the detectors and other parts of the experiment, and to generate shadowgrams (plots of the number of counts that reached each of the detectors). From these shadowgrams and applying a deconvolution procedure we obtained the images and were able to calculate the signal-to-noise ratio (SNR).

II Conferences and educational activities

II a Conferences and Other External Scientific Work

2014 **XXXVIII Reunião Anual da Sociedade Astronômica Brasileira, Armação dos Búzios, Brazil**, August, 31st - September, 4th, Poster: *Simulações de imagens de fontes brilhantes com o experimento protoMIRAX*, Authors: Penacchioni, A.V., Braga, J., Castro, M.A, D'Amico, F.

2015 **XIII International Workshop on Hadron Physics, Angra dos Reis, Brazil**, March, 22nd - 27th, Poster: *Telescope performance and image simulations of the balloon-borne coded-mask protoMIRAX experiment*, Authors: Penacchioni, A.V., Braga, J., Castro, M.A, D'Amico, F.

2015 2nd **Cesar Lattes Meeting, Niterói & Rio de Janeiro, Brazil**, April, 13th - 18th, Oral presentation: *Telescope performance and image simulations of the coded-mask balloon-borne protoMIRAX experiment*.

2015 **XIV Marcel Grossmann Meeting, Rome, Italy**, July, 13th -18th, Oral presentation: *Telescope performance and image simulations of the coded-mask balloon-borne experiment protoMIRAX*.

2015 **High Energy Phenomena in Relativistic Outflows (HEPRO) V**, La Plata, Argentina, October, 5th-8th, Oral presentation: *Estimating GRB detection rate with MIRAX*.

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

2015 **XIV Marcel Grossmann Meeting, Rome, Italy, July, 13th -18th**, Oral presentation: *Telescope performance and image simulations of the coded-mask balloon-borne experiment protoMIRAX*.

III b. Outside ICRANet

IV. Other

2015 List of Publication

Publications in international journals

2015 **GRB 130427A and SN 2013cq: A Multi-wavelength Analysis of An Induced Gravitational Collapse Event**, Ruffini, R.; Wang, Y.; Kovacevic, M.; Bianco, C. L.; Enderli, M.; Muccino, M.; Penacchioni, A. V.; Pisani, G. B.; Rueda, J. A., ApJ, 798, 10R, DOI: [10.1088/0004-637X/798/1/10](https://doi.org/10.1088/0004-637X/798/1/10).
<http://adsabs.harvard.edu/abs/2015ApJ...798...10R>

2015 **Telescope performance and image simulations of the balloon-borne coded- mask protoMIRAX experiment**, Penacchioni, A.V., Braga, J., Castro, M., D'Amico, F., Journal of High Energy Astrophysics, Volume 5, p. 22-29, DOI: [10.1016/j.jheap.2015.01.001](https://doi.org/10.1016/j.jheap.2015.01.001).
<http://adsabs.harvard.edu/abs/2015JHEAp...5...22P>

2015 **The protoMIRAX hard X-ray imaging balloon experiment**, Braga, J.; D'Amico, F.; Avila, M. A. C.; Penacchioni, A. V.; Sacabui, J.R.; de Santiago, V. A.; Mattiello- Francisco, F.; Strauss, C.; Fialbo, M. A. A., A&A, Volume 580, id.A108, 9 pp, DOI: [10.1051/0004-6361/201526343](https://doi.org/10.1051/0004-6361/201526343).
<http://adsabs.harvard.edu/abs/2015A%26A...580A.108B>

2015 **On binary driven hypernovae and their nested late X-ray emission**, Muccino, Marco; Ruffini, Remo; Bianco, Carlo Luciano; Enderli, Maxime; Kovacevic, Milos; Izzo, Luca; Penacchioni, Ana Virginia; Pisani,

Giovanni Battista; Rueda, Jorge A.; Wang, Yu, Astronomy Reports, Volume 59, Issue 7, pp.581-590, DOI: [10.1134/S1063772915070070](https://doi.org/10.1134/S1063772915070070).
<http://adsabs.harvard.edu/abs/2015ARep...59..581M>

2015 **Induced gravitational collapse in the BATSE era: The case of GRB 970828**, *Ruffini, R.; Izzo, L.; Bianco, C. L.; Rueda, J. A.; Barbarino, C.; Dereli, H.; Enderli, M.; Muccino, M.; Penacchioni, A. V.; Pisani, G. B.; Wang, Y.*, Astronomy Reports, Volume 59, Issue 7, pp.626-638, DOI: [10.1134/S1063772915070094](https://doi.org/10.1134/S1063772915070094). <http://adsabs.harvard.edu/abs/2015ARep...59..626R>

2015 **Predicting supernova associated to gamma-ray burst 130427a**, *Wang, Y.; Ruffini, R.; Kovacevic, M.; Bianco, C. L.; Enderli, M.; Muccino, M.; Penacchioni, A. V.; Pisani, G. B.; Rueda, J. A.*, Astronomy Reports, Volume 59, Issue 7, pp.667- 671, DOI: [10.1134/S1063772915070148](https://doi.org/10.1134/S1063772915070148).
<http://adsabs.harvard.edu/abs/2015ARep...59..667W>

2015 **GRB 140619B: a short GRB from a binary neutron star merger leading to black hole formation**, *Ruffini, R.; Muccino, M.; Kovacevic, M.; Oliveira, F. G.; Rueda, J. A.; Bianco, C. L.; Enderli, M.; Penacchioni, A. V.; Pisani, G. B.; Wang, Y.; Zaninoni, E.*, The Astrophysical Journal, Volume 808, Issue 2, article id. 190, 14 pp, DOI: [10.1088/0004-637X/808/2/190](https://doi.org/10.1088/0004-637X/808/2/190).
<http://adsabs.harvard.edu/abs/2015ApJ...808..190R>

Proceedings

2014 **The Large Observatory for X-ray timing**, *Feroci, M.; den Herder, J. W.; Bozdoğan, E.; [...]; Penacchioni, A. V.; Perez, M. A. et al.*, Proceedings of the SPIE, Volume 9144, id. 91442T 20 pp., DOI: [10.1117/12.2055913](https://doi.org/10.1117/12.2055913). <http://adsabs.harvard.edu/abs/2014SPIE.9144E..2TF>

2015 **GRB 090510, Explosion of a GRB in the Highest Circumburst Medium Ever Inferred: a Disguised Short GRB**, *Muccino, M.; Ruffini, R.; Bianco, C. L.; Izzo, L.; Penacchioni, A. V.; Pisani, G. B.*, The Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories - Proceedings of the MG13 Meeting on General Relativity (in 3 Volumes). Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN#9789814623995, pp. 1813-1816, DOI: [10.1142/9789814623995_0286](https://doi.org/10.1142/9789814623995_0286). <http://adsabs.harvard.edu/abs/2015mgm.conf.1813M>

2015 **On a Novel Distance Indicator for Gamma-Ray Bursts Associated with Supernovae**, *Pisani, G. B.; Izzo, L.; Ruffini, R.; Bianco, C. L.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Wang, Y.*, The Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories - Proceedings of the MG13 Meeting on General Relativity (in 3 Volumes). Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN#9789814623995, pp. 1789-1793, DOI: [10.1142/9789814623995_0283](https://doi.org/10.1142/9789814623995_0283). <http://adsabs.harvard.edu/abs/2015mgm.conf.1789P>

2015 **GRB 111228, Analysis Within the Induced Gravitational Collapse Scenario and Association with a Supernova**, *Penacchioni, A. V.; Ruffini, R.; Bianco, C. L.; Izzo, L.; Muccino, M.; Pisani, G. B.*, The Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories - Proceedings of the MG13 Meeting on General Relativity (in 3 Volumes). Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN#9789814623995, pp. 1781-1785, DOI: [10.1142/9789814623995_0281](https://doi.org/10.1142/9789814623995_0281). <http://adsabs.harvard.edu/abs/2015mgm.conf.1781P>

2015 **The Family of the Induced Gravitational Collapse Scenario: the Case of GRB 110709B**, *Penacchioni, A. V.; Ruffini, R.; Bianco, C. L.; Izzo, L.; Muccino, M.; Pisani, G. B.; Rueda, J. A.*, The Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories - Proceedings of the MG13 Meeting on General Relativity (in 3 Volumes). Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN#9789814623995, pp. 1768-1772, DOI: [10.1142/9789814623995_0278](https://doi.org/10.1142/9789814623995_0278).
<http://adsabs.harvard.edu/abs/2015mgm..conf.1768P>

2015 **GRB 090227B: the Missing Link Between the Genuine Short and Long GRBs**, *Muccino, M.; Ruffini, R.; Bianco, C. L.; Izzo, L.; Penacchioni, A. V.; Pisani, G. B.*, The Thirteenth Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories - Proceedings of the MG13 Meeting on General Relativity (in 3 Volumes). Edited by ROSQUIST KJELL ET AL. Published by World Scientific Publishing Co. Pte. Ltd., 2015. ISBN#9789814623995, pp. 1757-1759, DOI: [10.1142/9789814623995_0275](https://doi.org/10.1142/9789814623995_0275).
<http://adsabs.harvard.edu/abs/2015mgm..conf.1757M>

Siutsou Ivan

Position: post-doc of CAPES-ICRANet program,
ICRANet-Rio, CBPF
Period covered: 2015



I Scientific Work

1. *Work on numerical solution of Boltzmann equations for mildly relativistic electron-positron-photon plasma taking into account Bose enhancement and Pauli blocking*
2. *Work on GRB emission mechanisms*

II Conferences and educational activities

II a Conferences and Other External Scientific Work

1. *The Second ICRANet César Lattes Meeting, Niterói - Rio De Janeiro, April 13-18, 2015*
2. *Fourteenth Marcel Grossmann Meeting - MG14, University of Rome "La Sapienza" - Rome, July 12-18, 2015*

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

2015 List of Publication

1. Siutson, I.; Argüelles, C. R.; Ruffini, R. *Dark matter massive fermions and Einasto profiles in galactic haloes* // *Astronomy Reports, Volume 59, Issue 7*, pp.656-666
2. Fraga, Bernardo M. O.; Argüelles, Carlos; Ruffini, Remo; Siutson, Ivan. *Semidegenerate Self-Gravitating System of Fermion as Dark Matter on Galaxies i: Universality Laws* // *The Thirteenth Marcel Grossmann Meeting: World Scientific Publishing Co. Pte. Ltd., 2015. ISBN #9789814623995*, pp. 1730-1733
3. Boshkayev, K.; Rueda, J. A.; Ruffini, R.; Siutson, I. *General Relativistic and Newtonian White Dwarfs* // *The Thirteenth Marcel Grossmann Meeting: World Scientific Publishing Co. Pte. Ltd., 2015. ISBN #9789814623995*, pp. 2468-2474
4. Bégue, Damien; Siutson, Ivan; Vereshchagin, Gregory. *On the Decoupling of Photons from Relativistically Expanding Outflows* // *The Thirteenth Marcel Grossmann Meeting: World Scientific Publishing Co. Pte. Ltd., 2015. ISBN #9789814623995*, pp. 1760-1761
5. Ruffini, R.; Siutson, I. A.; Vereshchagin, G. V. *Photon Thick and Photon Thin Relativistic Outflows and GRBs* // *The Thirteenth Marcel Grossmann Meeting: World Scientific Publishing Co. Pte. Ltd., 2015. ISBN #9789814623995*, pp. 1748-1750
6. I. A. Siutson, A. G. Aksenov, G. V. Vereshchagin. *On Thermalization of Electron-Positron-Photon Plasma* // *Proceedings of The Second ICRANet César Lattes Meeting (accepted)*

Position: CAPES – ICRANet Postdoctoral Fellow
Period covered: April 2014 – September 2015



I Scientific Work

My research focuses on gamma-ray bursts (GRBs), in particular on X-ray and optical data analysis and their interpretation.

During my PhD (2010-2013), I worked in the Professor Chincarini group at the Brera Observatory in Merate. Me and my collaborators created a catalogue of X-ray and optical light-curves of GRBs. From this catalogue, we found out a correlation between the X-ray energy, the gamma-ray isotropic energy and the peak energy ($E_{X,iso} - E_{\gamma, iso} - E_{pk}$), which is followed by long and short GRBs as a whole. This was an important result, since other well known correlations, as the Amati relation, are followed only by long GRBs, and it links together prompt and afterglow emission properties, posing new questions about the nature and classification of GRBs. Since this year is the tenth anniversary of the launch of Swift satellite, we updated this three parameter correlation with the data collected in the last four years, discussing the physics that is driving this correlation. This work was published in the “Monthly Notices of the Royal Society” Journal and it was presented in some international meetings: “Swift: 10 Years of Discovery” (Rome, Italy), “The Second ICRANet César Lattes Meeting” (Rio de Janeiro, Brazil), and “The Fourteenth Marcel Grossmann Meeting” (Rome, Italy).

Due to my experience on X-ray analysis, I collaborated with the ICRA group in Rome to complete a work about GRBs and cosmology. In particular, I collaborated in the sample selection, data collection, and fitting of the X-ray light-curves. The work was published in the “Astronomy and Astrophysics” Journal. In addition, I was involved in the articles about GRB 090510 and GRB 140609B and their interpretation with the fireshell model.

In the meanwhile I am collaborating with Dr. Ulisses Barres de Almeida (CBPF) on a statistical and temporal analysis of a sample of blazars observed both by Fermi and Catalina telescope. For the first part of the project, we are selecting the sample and collecting Catalina and Fermi data using the Asi Science Data Center (ASDC) tool.

II Conferences and educational activities

a. Conferences and Other External Scientific Work

July 12th – 18th, 2015: International conference, 'The Fourteenth Marcel Grossmann Meeting', Rome, Italy.

Talk: 'The GRB Universal Scaling $E_{X,iso} - E_{\gamma,iso} - E_{pk}$ with Ten Years of Swift Data'.

April 13th – 18th, 2015: International conference, 'The Second ICRANet César Lattes Meeting', Rio de Janeiro, Brazil.

Talk: 'Ten Years of Swift: a Universal Scaling for Short and Long Gamma-Ray Bursts ($E_{X,iso} - E_{\gamma,iso} - E_{pk}$)'.

December 2nd – 5th, 2014: International conference, 'Swift: 10 years of Discovery', Rome, Italy.

Poster: 'Ten Years of Swift: a Universal Scaling for Short and Long Gamma-Ray Bursts ($E_{X,iso} - E_{\gamma,iso} - E_{pk}$)'.

June 30th – July 4th, 2014: International conference, '1st ICRANet Meeting in Armenia: Black Holes, the largest Eenergy sources in the Universe', Yerevan, Armenia.

Talk: 'Gamma-ray bursts and their X-ray and optical afterglow'.

June 16th – 19th, 2014: International Workshop, 'Gamma-ray bursts in the Multi-messenger Era', Paris, France.

Posters: 'Gamma-ray burst optical light-curve zoo: comparison with X-ray observations'.

'The induced gravitational collapse and the binary driven hypernovae'

III. Service activities

a. Within ICRANet

Collaboration with the ICRA group in Rome, in particular, with Luca Izzo, Marco Muccino, Giovanni Pisani.

Collaboration with Lorenzo Amati (ICRANet external collaborator - INAF - IASF Bologna) and Paolo Giommi (ASDC - ASI).

b. Outside ICRANet

Collaboration with Ulisses Barres de Almeida (CBPF), Maria Grazia Bernardini (INAF-OAB Merate), Stefano Covino (INAF-OAB Merate), Raffaella Margutti (CfA - Harvard University).

2014 -2015 List of Publication

- Zaninoni, E., Bernardini, M.G., Margutti, R., & Amati, L. 2016, MNRAS, 455, 1375 .
- Izzo, L., Muccino, M., Zaninoni, E., Amati, L., & Della Valle, M. 2015, A&A, 582, A115.
- Ruffini, R., Muccino, M., Kovacevic, M., et al. 2015, ApJ, 808, 190.
- Becerra Bayona, L. M., Bianco, C.L., Enderli, M., et al. 2014, Proceedings of Swift: 10 Years of Discovery (SWIFT 10), 2014styd.confE.171B .
- Zaninoni, E., Bernardini, M. G., Margutti, R., & Amati, L. 2014, Proceedings of Swift: 10 Years of Discovery (SWIFT 10), 2014styd.confE.120Z.
- Pisani, G. B., Ruffini, R., Muccino, M., et al. 2014, Proceedings of Swift: 10 Years of Discovery (SWIFT 10), 2014styd.confE..97P.
- Muccino, M., Oliveira, F. G., Ruffini, R., et al. 2014, Proceedings of Swift: 10 Years of Discovery (SWIFT 10), 2014styd.confE..86M.

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 Administrative employee |
| Main activities and responsibilities | 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. R.I.B.A. 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. |

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| | 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. |

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| | 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 |

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| 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> |

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 Flli 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

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| Kind of Employment | Help desk |
| Main activities and responsibilities | <p>Web development: analysis and development of applications for managing stock of average complexity using PHP and MySQL technologies.</p> <p>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.</p> <p>Network management: implementation of procedures for the historicizing of traffic flows (NetFlow / PMAcct) generated by the various firewalls on the various local networks.</p> |

Date 2009 - 2009

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| Name of employer | Tipografia Flli Brandolini snc |
| Kind of Employment | Graphic designer |
| Main activities and responsibilities | <p>Network administrator</p> <p>Graphic design and layout texts</p> |

Education

Date September 2005 – 18 December 2012

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| Title of qualification awarded | Degree in Computer Science |
| Name and type of organisation providing education and training | <p>University of L'Aquila – Final marks: 88/110</p> <p>Thesis: “Analisi di prestazioni dell'instradamento in reti di sensori wireless”</p> |

Dates September 2009 – July 2005

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| Title of qualification awarded | Secondary School Degree |
| Name and type of organisation providing education and training | Istituto Tecnico Industriale Statale “Luigi di Savoia” - Chieti |

Personal skills and competences

Mother tongue Italian

English 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

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| Computer skills and competences | <p>Excellent knowledge of Operating Systems: Windows, Mac OS X and Linux.</p> <p>Excellent knowledge of Apple and Microsoft applications and Microsoft Office.</p> <p>Excellent knowledge, also, of various graphics and layout software.</p> <p>Excellent ability to use the Internet and manage applications that use them.</p> <p>Management of Local Area Networks LAN and WLAN and implementation of web applications.</p> <p>Excellent knowledge of HTML, PHP, CSS, Javascript, jQuery, MySQL.</p> <p>Good knowledge of C, C++, Java, VPN, Firewalling.</p> |
| Other skills and competences | <p>Considerable passion for the sport, followed and practiced.</p> |
| Driving licence | <p>Driving licence cat. A – B.</p> |

Di Berardino Federica

NAME FEDERICA DI BERARDINO
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FAX 0039-085-4219252
E-MAIL federica.diberardino@icranet.org
NATIONALITY Italian-American

DATE AND PLACE OF BIRTH 31-03-1980 PESCARA



WORK EXPERIENCE

- November 2005-present
- Head of Secretariat at ICRANet Pescara: supporting Director, responsible for day-to-day tasks and secretarial duties, overall responsibility for the smooth running of the secretarial office; supervising the work of office juniors and provide advice and training to them; organizing business travels, itineraries and accommodation; organizing and preparing agendas for board/scientific committee meetings, providing facilities, taking minutes; updating processing and filing of documents (both on paper and computer); organizing diaries and making appointments; handling incoming/out coming calls, faxes, e-mails inquiries and post; handling requests for information and data; coordinating and scheduling secretarial tasks; translations; arranging interviews for new administrative/secretarial staff recruitment.
- May-October 2005
- September-June 2005
- April 2005
- December 2004
- October-December 2004
- January-December 2004
- May 2004
- March 2004
- 2001-2004
- Travel Agent at “Beg Viaggi” Pescara;
 - Italian language trainer for foreign students;
 - Congress Hostess for IN FIERA S.r.l., at “ECOTUR 2005”- Montesilvano;
 - Congress Hostess for Manoppello Municipality (PE) on the occasion of the commemoration “Marcinelle 2005”;
 - Customer service assistant for Terravision S.r.l. at *Aeroporto d'Abruzzo*, Pescara;
 - Trainer/Supporter to elementary and high school Italian students for English language homeworks;
 - Translations from/to English;
 - Distribution of books in the local schools for Ajilon Agency, Pescara;
 - Customer satisfaction interviews for “NETWORK Research Institute S.r.l.” at Iper - Città Sant’Angelo;
 - Researcher for “Informazione e servizi senza barriere”(Agency: NETWORK S.r.l.);
 - Conference Hostess for IN FIERA S.r.l., at “ECOTUR – Turismo in fiera” 2001, 2002, 2003, 2004 (at *Palacongressi*, Montesilvano – PE);

- 2001-2003
 - Hostess and sales promoter for the agency “Image Service”, Città Sant’Angelo (PE);
- 1998-2000
 - Birthday party organizer for kids;
 - Educator and entertainment organizer in summer camps of E.N.I. in Cesenatico; additional training courses (*Cooperativa Sociale* D.O.C. S.c.r.l., Turin).

EDUCATION

- June 2004
 - Graduation in “Foreign Language and Literatures”, 110/110 *cum laudem*, at University G. D’annunzio (Pescara). Final thesis on “Problemi, tendenze e prospettive dello sviluppo socio-economico in Spagna. Casi di studio” (Supervisor: Prof. G. Massimi);
- January 2004
 - Researches in Spain for graduation thesis and improvement of Spanish language skills;
- September-December 2002
 - Four month period mobility at “Nazareth College”, Rochester, N.Y. (U.S.A.) and final exams on English language and literature; Marketing; Spanish language, history and culture;
- 1998
 - High School diploma at Foreign Languages High School “G. Marconi”, Pescara;
- October 1996
 - English language courses at “Irondequoit High-School” in Rochester (N.Y., USA);
- 1992, 1994, 1995
 - Multiple visits to England for training courses;
 - Visits to USA (N.Y. e Massachusetts) to improve oral skills for American-English.

SOCIAL-CULTURAL EXPERIENCES

January-March 2005: Trip to Vanuatu (Melanesian archipelago, former “New Hebrides”) for humanitarian-aid experience. Voluntary work in a few islands of the archipelago and elementary-level learning of local idiom, the Bislama.

PERSONAL SKILLS

Main studies and job experiences focused on foreign cultures and languages. Graduation on Spanish and English. Daily practice with both languages through conversation and readings. Good interpersonal and communications skills (both written and oral). Well presented.

MOTHER-TONGUE

ITALIAN

OTHER LANGUAGES

ENGLISH, SPANISH, FRENCH

RELATIONAL ABILITIES

Good attitude to work in multi-cultural contexts.

The two main training experiences in the US high school and later in college supported the personal and professional growth, helped to acquire an open-minded attitude towards other cultures, which are essential for cooperation and mutual respect.

The work as customer service assistant, hostess and sales promoter have been relevant in acquiring professional skills in the relationship with customers: importance of communication, which is the ability to listen to and to be listened.

ORGANIZING, PERSONAL AND OTHER COMPETENCES

Organizing abilities in team-work, accuracy, punctuality, positive attitude, problem-solving skills and working method based on the achievement of goals. Open and charismatic personality, highly resourceful, motivated, flexible, enthusiastic, active, dynamic, loving challenges. Ability to multitask and managing conflicting demands. Able to work to tight deadlines. Quick learner. Working at ICRANet consented to be experienced in coordinating, planning and organizing a wide range of secretarial activities, and in being a well organized good team-player with a proven ability to work proactively even whilst under pressure and in a complex and busy office environment.

TECHNICAL SKILLS

Computer competences: good knowledge of Windows. Daily use of Outlook, Thunderbird, Word, Excel, Power Point and FileMaker database.

2004: Certificate for Informatics Course on “Basic Office” (Word, Excel, Internet e E-mailing) organized by: “E-Work”, Pescara in cooperation with “Ok Work”, Milano.

ARTISTIC SKILLS

Photography: Diploma of Basic and advanced courses, Photo-reportage and work flow.

Dance: Jazz Dance, Flamenco, Swing/Lindy Hop, Afro-dance, Latin and Brazilian Dances, Traditional folk dances, Artistic Gym.

Piano and guitar basic skills.

Great passion for music (jazz, acoustic, ethnic, rock and classic), theatre and readings.

Free time: travels and photography.

DRIVING LICENCE

Driving license cat. B

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
Avenida 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

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| 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” |

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| 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. |

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| 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. |

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|--|---|
| 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 |

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| <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> | <p>Very good sense of organisation and time planning abilities;</p> <p>Self rigorousness and self discipline;</p> <p>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)</p> |
| <u>Computer skills and competences</u> | <p>Very good command of Microsoft Office (Word, Excel e PowerPoint);</p> <p>Very good knowledge of Internet and web search engines;</p> <p>Knowledge of graphic application.</p> |

Latorre Silvia



PERSONAL INFORMATION

| | |
|-------------------------|----------------------------|
| Place and date of birth | Chieti, 23/09/1982 |
| Nationality | Italian |
| E- mail | silvia.latorre@icranet.org |
| Phone | 085 – 23054223 |
| 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, cash holding, 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: “ <i>La leva finanziaria e la leva operative nel settore pastario</i> ” (supervisor Prof. Michele A. Rea) |
| • Mark | 110/110 <i>cum laude</i> |
| • 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 |

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| <ul style="list-style-type: none"> • Date • Institution • Main Subjects • Achieved Qualification • Mark | <p>09/1996 – 07/2001</p> <p>Secondary School focusing on sciences- Liceo Ginnasio Statale “Publio Virgilio Marone” Vico del Gargano (FG)</p> <p>Mathematics analysis, Italian language and literature, Latin language and literature, Chemistry, Physics</p> <p>Scientific school-leaving certificate</p> <p>100/100</p> |
| FOREIGN LANGUAGES | ITALIAN |
| MOTHER-TONGUE | |
| OTHER LANGUAGES | ENGLISH (GOOD) – FRENCH (ELEMENTARY) |
| RELATIONAL ABILITIES | <p>Good relational abilities thanks to the past work experience at DelVerde and to the present experience at ICRANet.</p> <p>Self-reliant.</p> <p>Good listener.</p> |
| ORGANIZING COMPETENCES | <p>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.</p> |
| TECHNICAL SKILLS | <p>Computers competences: Windows. Softwares: Word, Excel, Power Point. Very good use of Internet and e-mail accounts.</p> <p>Good use of cost-accounting system HELPAZI and bank system BNL Businessway.</p> <p>Elementary knowledge of HTML e CSS programs for websites.</p> <p>Knowledge of “TOP VALUE” program for financial diagnosis and corporate planning.</p> |
| 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. |