

## Lattanzi Massimiliano

Position: ICRA Postdoctoral fellow  
Physics Department, "Sapienza" University of Rome  
Period covered: January 2010 – Present.



### I. Scientific Work

In the last year, I have been working mainly in the fields of Particle Cosmology and Astroparticle Physics. In particular, I have been studying the possibility of detecting the imprint of the annihilation of supersymmetric dark matter in the 21 cm signal, induced by the heating and ionization of the intergalactic medium. I have also been studying "axion-like" dark matter candidates arising in theories of gravity with torsion and in see-saw models for neutrino mass generation. Another line of research has been the study of the interaction of cosmological gravitational waves with relic neutrinos, and of the possibility of detecting the signature of neutrino decoupling in the spectrum of gravitational waves, through Pulsar Timing Arrays. Finally, I have also been working on the estimation of cosmological parameters from the observational data, in the framework of models with varying fundamental constants, and on the viability of models with zero cosmological constant and a non-standard spectrum of primordial perturbations.

During 2010, the above mentioned work has led to the publication of 12 scientific papers, of which 8 in peer-reviewed international journals, and 4 in conference proceedings.

### II. Conferences and educational activities

#### *II a. Conferences and Other External Scientific Works*

I have attended the following conferences:

Jan 2010 - 14th Gravitational Waves Data Analysis Workshop, Rome, Italy

Jul 2010 – 16th International Symposium on Particles, Strings and Cosmology, Valencia, Spain

#### *II b. Work With Students*

I have been working with IRAP Ph.D. students Stefania Pandolfi and Eloisa Menegoni.

#### *II c. Work With Postdocs*

I have been collaborating with Dr. Riccardo Benini.

### III. Service activities

#### *III a. Within ICRANet*

ICRA Post-doc at the Physics Department, University of Rome "Sapienza".

### 2010 List of Publications

1. Signatures of clumpy dark matter in the global 21 cm background signal

D. Cumberbatch, M. Lattanzi, J. Silk, Phys. Rev. D in press.

e-Print: arXiv:0808.0881 [astro-ph].

2. On the viability of a non-analytical  $f(R)$ -theory

N. Carlevaro, G. Montani, M. Lattanzi, in Proceedings of the workshop: Cosmology, the Quantum Vacuum and Zeta Functions.

e-Print: arXiv:1007.5397v1[gr-qc]

3. A possible signature of cosmic neutrino decoupling in the nHz region of the spectrum of primordial gravitational waves

M. Lattanzi, R. Benini, G. Montani, *Class. Quant. Grav.* 27, 194008, (2010).

4. Signatures of the neutrino thermal history in the spectrum of primordial gravitational Waves  
R. Benini, M. Lattanzi, G. Montani, *Gen. Rel. Grav.* online first, doi:10.1007/s10714-010-0994-4.  
e-Print: arXiv:1009.61190 [astro-ph.CO]

5. A solution of the strong CP problem via the Peccei-Quinn mechanism through the Nieh-Yan modified gravity and cosmological implications  
M. Lattanzi, S. Mercuri, *Phys. Rev. D* 81, 125015 (2010).  
e-Print: arXiv:0911.2698 [gr-qc]

6. Inflation with primordial broken power law spectrum as an alternative to the concordance cosmological model  
S. Pandolfi, E. Giusarma, M. Lattanzi, A. Melchiorri, *Phys. Rev. D* 81, 103007 (2010).

7. The majoron: a new dark matter candidate  
M. Lattanzi, *J. Kor. Phys. Soc.* 56, 1677, 2010.

8. Constraints on the dark energy equation of state in presence of a varying fine structure constant  
E. Menegoni, S. Pandolfi, S. Galli, M. Lattanzi, A. Melchiorri, *Int. J. Mod. Phys. D* 19, 507 (2010).

9. A separable solution for the oscillatory structure of plasma in accretion disks  
M. Lattanzi, G. Montani, *Europhys. Lett.* 89, 39001 (2010).  
e-Print: arXiv:1001.2430 [astro-ph.SE]

10. On the propagation of gravitational waves across the Universe: interaction with the neutrino component.  
R. Benini, M. Lattanzi, G. Montani, to appear in *Proceedings of the Twelfth Marcel Grossmann Meeting on General Relativity*, eds. T. Damour, R. T. Jantzen and R. Ruffini, World Scientific, Singapore, 2010.

11. Enhancement of the dark matter annihilation cross section in cold substructures  
M. Lattanzi, to appear in *Proceedings of the Twelfth Marcel Grossmann Meeting on General Relativity*, eds. T. Damour, R. T. Jantzen and R. Ruffini, World Scientific, Singapore, 2010.

12. Enhancement of the dark matter annihilation cross section in the low-velocity regime  
M. Lattanzi, in *Proceedings of the Third Stueckelberg Workshop on Relativistic Field Theories*, Eds. N. Carlevaro, G. Vereshchagin, Cambridge University Press, 2010