Faculty, Adjunct professors, Research scientists,

Visiting scientists, Lecturers, PhD students, Post-doc

and Staff

at the Pescara Center

November 2016

Contents

ICRANet Faculty Staff

Barres de Almeida, Ulisses	CBPF, Rio de Janeiro, Brazil
Belinski, Vladimir	ICRANet
Bianco, Carlo Luciano	ICRANet and Università di Roma "Sapienza"
Filippi, Simonetta	ICRANet and Campus Biomedico, Italy
Kerr, Roy P.	Yevgeny Mikhajlovic Lifshitz - ICRANet University of Canterbury, New Zeland
Muccino, Marco	ICRANet and Università di Roma "Sapienza"
Pisani, Giovanni Battista	ICRANet and Università di Roma "Sapienza"
Punsly, Brian Mathew	Mathew California University, Los Angeles USA
Rueda, Jorge A.	ICRANet and Università di Roma "Sapienza"
Ruffini, Remo	ICRANet and Università di Roma "Sapienza"
Vereshchagin, Gregory	ICRANet
Xue, She Sheng	ICRANet

Adjunct Professors of the Faculty

Aharonian, Felix Albert	*Benjamin Jegisghewitsch Markarjan Chair*, Dublin Institute for Advanced Studies, Dublin, Ireland, Max Planck Institut fur Kernphysis, Heidelberg, Germany
Amati, Lorenzo	Istituto di Astrofisica Spaziale e Fisica Cosmica, Italy
Arnett, David	*Subramanyan Chandrasektar - ICRANet Chair*, University of Arizona, Tucson, AZ, USA
Bini, Donato	CNR, Italy
Buchert, Thomas	University of Lyon, Saint-Genis-Laval, France
Chakrabarti, Sandip Kumar	Indian Centre for Space Physics, Kolkata, India
Chardonnet, Pascal	Université de la Savoie, France and ICRANet
Chechetkin, Valeri	*Mstislav Vsevolodich Keldysh - ICRANet Chair*, Keldysh Institute for Applied Mathematics, Moscow, Russia
Damour, Thibault	*Joseph-Louis Lagrange - ICRANet Chair*, IHES, Bures sur Yvette, France
Della Valle, Massimo	Osservatorio di CapodiMonte, Italy
Einasto, Jaan	Tartu Observatory, Tõravere, Estonia
Everitt, Francis	*William Fairbank - ICRANet Chair*, Stanford University, USA
Frontera, Filippo	University of Ferrara, Italy
Fryer, Chris L.	University of Arizona, Tucson, Arizona, USA
Giavalisco, Mauro	University of Massachusetts
Gionti, Gabriele	Vatican Observatory
Harutyunian, Haik	Byurakan Astrophysical Observatory
Jantzen, Robert	*AbrahamTaub-ICRANet Chair*, Villanova University, USA
Jetzer, Philippe	Istitute of Theoretical Physics - University of Zürich, Switzerland
Khalatnikov Isaak M.	*Lev Davidovich Landau - ICRANet Chair*

Kleinert, Hagen	*Richard Feynmann - ICRANet Chair*, Freie Universitat Berlin
Lee, Hyung Won	Inje University, Korea
Madey, John	University of Hawaii
Mansouri, Reza	Sharif University of Technology
Mathews, Grant	University of Notre Dame
Mirabel, Felix	CEA
Misner, Charles	*John Archibald Wheeler - ICRANet Chair*, University of Maryland - USA
Mo, Houjun	University of Massachusetts
Nicolai, Hermann	Albert Einstein Institute – Potsdam, Germany
Pelster Axel	Hanse Institute of Advanced Study, Germany
Pian, Elena	INAF - Osservatorio Astronomico Trieste, Italy
Piran, Tsvi	*Yuval Neeman-ICRANet Chair*, the Hebrew University, Israel
Popov, Vladimir	ITEP, Russia
Quevedo, Hernando	Institute of Nuclear Science, UNAM
Rosati, Piero	European Southern Observatory, Germany
Sahakyan, Narek	ICRANet-Yerevan, Armenia
Sobouti, Yousef	Institute for Advanced Studies in Basic Sciences, IASBS, Iran
't Hooft, Gerard	Nobel Laureate, Institut for Theoretical Physics, Utrecht Universiteit, Holland
Titarchuk, Lev	*Victor Sobolev – ICRANet Chair*, US Naval Laboratory, USA
Zen Vasconcellos, Cesar Augusto	UFRGS, Porto Alegre, RS, Brazil

Lecturers

Aksenov, Alexei	Institute for Theoretical and Experimental Physics
Alekseev, Georgy	Steklov Mathematical Inst- Russian Acad of Sciences
Chen, Pisin	National Taiwan University, Kavli Instit. Particle Astrophysics and Cosmology
Cherubini, Christian	Campus Biomedico, Rome, Italy
Chieffi, Alessandro	INAF, Rome, Italy
Coullet, Pierre	Université de Nice - Sophia Antipolis, France
Di Castro, Carlo	Università di Roma "Sapienza", Italy
Jing, Yi-Peng	Shangai Astronomy Observatory
Lanz, Thierry	Observatorire de la Côte d'Azur, Nice, France
Lee, Chul Hoon	Hanyang University, Seoul, Korea
Lee, Hyun Kyu	Department of Physics, Hanyang University, Korea
Limongi, Marco	INAF, Rome, Italy
Lou, You Qing	Tsinghua University, Beijing
Mester, John	Stanford University, USA
Ohanian, Hans	Rensselaer Polytechnic Institute, New York, USA
Pacheco, José	Observatoire de la Côte d'Azur, Nice, France
Perez Bergliaffa, Santiago	Univesidade do Estado de Rio de Janeiro, Brasil
Pucacco Giuseppe	Università di Tor Vergata, Rome, Italy
Sang Pyo Kim	Kunsan National University, Korea
Sepulveda, Alonso	University of Antioquia, Columbia
Song Doo Jong	Korea Astronomy and Space Science Institute, South Korea
Starobinsky, Alexei	Landau Institute for Theoretical Physics, Russia
Sung-Won Kim	Institute of Theoretical Physics for Asia-Pacific, Korea
Vissani, Francesco	Gran Sasso National Laboratory, Italy

Wiltshire David University of Canterbury, New Zealand

Research Scientists

Arguelles, Carlos	ICRANet
Benetti, Micol	ICRANet
Bernardini, Maria Grazia	ICRANet and Università di Roma "Sapienza", Italy
Boshkayev, Kuantay	ICRANet
Geralico, Andrea	ICRANet and Università di Roma "Sapienza", Italy
Ivan Siutsou	ICRANet
Lattanzi, Massimiliano	University of Oxford and ICRANet
Patricelli, Barbara	ICRANet and Università di Roma "Sapienza", Italy
Rotondo, Michael	ICRANet and Università di Roma "Sapienza", Italy
Sigismondi, Costantino	ICRANet
Ana Pennacchioni	Post Doc Università di Siena

Visiting Scientists

Abishev, Medeu	Al-Farabi Kazakh National University, Kazakhstan
Ahmedov, Bobomurat	Uzbekistan Academy of Sciences
Ansoldi, Stefano	University of Udine
Arkhangelskaya, Irene	Moscow Engineering Physics Institute, Russia
Batebi, Saghar	Isfahan University of Technology, Iran
Bavarsad, Ehsan	Isfahan University of Technology, Pakistan
Bernal, Cristian Giovanny	Universidad Nacional Autónoma de México (UNAM), Mexico
Blinne, Alexander	University Jenna, Germany
Cadez, Andrej	University of Ljubljana, Slovenia
Cho, Yongmin	UNIST
Corvino, Giovanni	University of Rome La Sapienza, Italy
da Cunha, Bruno Carneiro	UFPE, Brazil
Davis, Stanley	Université Bordeaux, France
De Lorenci, Vitorio	Federal University Of Itajuba - Brazil
Ewald, Denise Grüne	Universidade Federal do Rio Grande do Sul, Brazil
Fimin, Nicolaj	Keldish Institute for Applied Mathematics, Russia
Gadri, Mohamed	University of Tripoli, Libya
Goulart, Erico	Centro Brasileiro de Pesquisas Físicas, Brazil
Guzzo, Marcelo Moraes	Universidade Estadual de Campinas, Brazil
Haghighat, Mansour	Isfahan University of Technology, Iran
Hoang, Ngoc-Long	IPE, Hanoi, Vietnam
Hütsi, Gert	Tartu Observatory, Estonia
Hyung Won Lee	Inje University, South Korea
Kenesbek, Zhadyra	Al-Farabi Kazakh National University, Kazakhstan

Kim, Hongsu	KASI
Kim, Hyeong-Chan	Chungju National University
Kim Sang Pyo	Kunsan National University, South Korea
Kim, Hyuong Yee	INJE, South Korea
Kim, Jim Young	Kunsan National University
Lee, Chang-Hwan	Pusan National University
Lee, Wonwoo	Cquest, Sogang University
Linnea Hjalmarsdotter	
Malheiro, Manuel	ITA, Brazil
Mansouri, Reza	Sharif University of Technology, Iran
Mohammadi, Rohollah	Isfahan University of Tecnology, Iran
Mosquera Cuesta, Herman	Instituto Federal de Educação, Ciência e Tecnologia do Ceará, Brazil
Motie, Iman	Isfahan University of Tecnology, Pakistan
Nagataki, Shigehiro	Yukawa Institute for Theoretical Physics, Kyoto University
Nessipbay, Aizhan	Al-Farabi Kazakh National University, Kazakhstan
Park, Ilhung	Ieu, Ewha Womans University
Park, Myeong-Gu	Kyungpook National University
Passiltay, Ainur	Al-Farabi Kazakh National University, Kazakhstan
Paudel, Rishiram	Tribhuvan University, Central Department of Physics
Peres Menezes, Débora	Universidade Federal de Santa Catarina, Brazil
Peresano, Michele	University of Udine, Italy
Perez Bergliaffa, Santiago	Universidade do Estado do Rio de Janeiro, Brazil
Perez Martinez, Aurora	Instituto de Cibernetica Matematica Y Fisica, Cuba
Piechocki, Wlodzimierz	Institute for Nuclear Studies - Poland
Picanço Negreiros, Rodrigo	Universidade Federal Fluminense, Brazil

Pinto Neto, Nelson	Centro Brasileiro de Pesquisas Físicas, Brazil
Qadir, Ashgar	National University of Sciences and Technology - Pakistan
Raffaelli, Bernard	Université de Corse, France
Rashid, Riahi	PhD student at the Isfahan University of Technology, Iran
Romero, Gustavo E.	Instituto Argentino de Radioastronomia IAR-CONICET, Argentina
Sasaki, Misao	Kyoto University, Japan
Soroush, Shakeri	PhD Student at Isfahan University of Technology, Iran
S. O. Kepler	Universidade Federal do Rio Grande do Sul, Brazil
Tarasenko, Aleksander	Belarusian State University
Teixeira Coelho, Hélio	Universidade Federal de Pernambuco, Brazil
Tkachenko, Alessya	Al-Farabi Kazakh National University, Kazakhstan
Torres, Sergio	Centro Internacional de Fisica, Bogotà, Colombia
Torrieri, Donato Giorgio	Universidade Estadual de Campinas, Brazil
Tizchang, Seddigheh	Isfahan University of Technology, Iran
Van Putten, Maurice	Korean Institute for Advanced Study, South Korea
Yang, Jongmann	Ieu, Ewha Womans University
Yeom, Dong-Han	Cquest, Sogang University
Zalaletdinov, Roustam	Dept. of Theoretical Physisc, Institute of Nuclear Physics, Uzbek Acadeny of Sciences, Uzbekistan
Zhumabayeva, Symbat	Al-Farabi Kazakh National University, Kazakhstan

International Relativistic Astrophysics Ph. D

First Cycle	*2002-2005*
Peirani, Sebastien	France
Second Cycle	*2003-2006*
Bernardini, Maria Grazia	Italy
Mattei, Alvise	Italy
Mercuri, Simone	Italy
Third Cycle	2004-2007
Chiappinelli, Anna	France
Cianfrani, Francesco	Italy
Guida, Roberto	Italy
Rotondo, Michael	Italy
Yegorian, Gegham	Armenia
Vereshchagin, Gregory	Belarus
Fourth Cycle	2005-2008
Battisti, Marco Valerio	Italy
Dainotti, Maria Giovanna	Italy
Khachatryan, Harutyun	Armenia
Lecian, Orchidea Maria	Italy
Pizzi, Marco	Italy
Pompi, Francesca	Italy
Fifth Cycle	*2006-2009*
Caito, Letizia	Italy
De Barros, Gustavo	Brazil
Minazzoli, Olivier	Switzerland
Patricelli, Barbara	Italy
Rangel Lemos, Luis Juracy	Brazil
Rueda Hernandez, Jorge Armando	Colombia
Sixth Cycle	*2007-2010*
Ferroni, Valerio	Italy
Izzo, Luca	Italy
Kanaan, Chadia	
Pugliese, Daniela	Italy
Sigismondi, Costantino	Italy
Siutsou, Ivan	Belarus
Seventh Cycle	*2008-2011*
Belvedere, Riccardo	Italy
Ceccobello, Chiara	
Ferrara, Walter	Italy
Han, Wen-Biao	China
Luongo, Orlando	Italy
Pandolfi, Stefania	Italy
Taj, Safia	Pakistan

Eighth Cycle	*2009-2012*
Boshkayev, Kuantay	Kazakhstan
Bravetti, Alessandro	Italy
Haney, Maria	Germany
Lombardi, Caterina Antonietta	Italy
Menegoni, Eloisa	Italy
Sahakyan, Narek	Armenia
Sahini, Sahil	India
Ninth Cycle	*2010-2013*
Arguelles, Carlos	Argentina
Benetti, Micol	Italy
Muccino, Marco	Italy
Tenth Cycle	*2011-2014*
Cáceres Uribe, Diego Leonardo	Colombia
Wang, Yu	China
Eleventh Cycle	*2012-2015*
Barbarino, Cristina	Italy
Cipolletta, Federico	Italy
Dichiara, Simone	Italy
Twelfth Cycle	*2013-2016*
Becerra, Laura	Colombia
Harutyunyan, Vahagn	Armenia
Thirteenth Cycle	*2014-2017*
Moradi, Rahim	Iran
Rodriguez Ruiz, Jose Fernando	Colombia
Fourteenth Cycle	*2015-2018*
Melon Fuksman, J. David	Argentina
Primorac, Daria	Croatia
Uribe S., Juan D.	Colombia

IRAP Ph. D. Erasmus Mundus Students

First Cycle	*2010-2013*
Baranov, Andrey	Russia
Benedetti. Alberto	Italy
Dutta, Parikishit	India
Fleig, Philipp	Germany
Gruber, Christine	Austria
Liccardo, Vincenzo	Italy
Machado De Oliveira Fraga, Bernardo	Brazil
Martins De Carvalho, Sheyes	Brazil
Penacchioni, Ana Virginia	Argentina
Valsan, Vineeth	India
Second Cycle	*2011-2014*
Begue, Damien	France
Dereli, Husne	Turkey
Gregoris, Daniele	Italy
Iyyani, Shabnam Syamsunder	India
Pereira, Jonas Pedro	Brazil
Pisani, Giovanni	Italy
Rakshit, Suvendu	India
Sversut Arsioli, Bruno	Brazil
Wu, Yuanbin	China
Third Cycle	*2012-2015*
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
Fourth Cycle	*2013-2016*
Ahlén, Olof	Sweden
Gómez Diaz, Gabriel	Colombia
Kovacevic, Milos	Serbia
Li, Liang	China
Lisakov, Sergey	Russia
Maiolino, Tais	Brazil
Sridhar, Srivatsan	India
Stahl, Clément	France
Yang, Xiaofeng	China
Fifth Cycle	*2014-2017*
Aimuratov, Yerlan	Kazakhstan
Chang, Yu-Ling	Taiwan

Delgado, Camilo	Colombia
Efremov, Pavel	Russia
Karilca, Mile	Croatia
Krut, Andreas	Germany
Martinez Aviles, Gerardo	Mexico

CAPES

First Cycle	*2013-2016*
Brandt Carlos Henrique	Brazil
Guimarães Carvalho Gabriel	Brazil
Lobo Pereira Iarley	Brazil

Administrative and Secretarial Staff

ICRANet - Pescara

Adamo, Cristina	Administrative Office
Brandolini, Gabriele	System Manager
Ciampaglione, Maria	Secretariat (since June 2016)
Di Berardino, Federica	Head of the Secretarial Office
Di Ianni, Marco	System Manager (since July 2016)
Di Niccolo, Cinzia	Secretariat
Di Vito, Francesca	Administrative Office (maternity-replacement until November 2016)
Latorre, Silvia	Administrative Office
Verzulli, Damiano	System Manager

ICRANet Ar – Armenia

Kostandjan Susanna

ICRANet Faculty Staff

Barres de Almeida, Ulisses

Position: Adjunct Professor
Period covered: 2016

I Scientific Work

My main scientific activities focus on gamma-ray astrophysics and astroparticle physics. In particular, on planning and development of a new gamma-ray detector for the LATTES project, and, as a member of the Cherenkov Telescope Array Consortium (CTA), I am responsible for the optical system of the prototype Large Size Telescope (LST-1). In the MAGIC Collaboration, I serve as member of the publication committee. I am also responsible for the project of the Brazilian Science Data Center (BSDC).

II Conferences and educational activities

II a Conferences and Other External Scientific Work

As organizer:

1. Gravitation, Astrophysics and Cosmology (GrACo III) - LOC

2. IWARA 2016 - 7th International Workshop on Relativistic Astrophysics. - Scientific Committee

3. GROUP 31 - 31st International Colloquium on Group Theoretical Methods in Physics. - LOC

As invited / participant:

1. Astroparticle Physics @ Yachay. Design and expected performance of a novel hybrid detector for very-high-energy gamma astrophysics. (Equador) - invited

2. BRICS Astronomy Workshop 2016 Astronomical Data and Computation.Implementation of a Brazilian Science Data Center (Russia) - invited.

3. CTA Archive Interface Meeting. (Italy)

4. CTA Consortium Meeting (FALL). (Italy).

5. CTA Large Size Telescope General Meeting.Final Report on the Interface Plates Project for the LSTs. (Germany).

6. Gravitation, Astrophysics and Cosmology - GrACo III. Update on the status of the Cherenkov Telescope Array (Brazil).

7. The Lake Baikal Three Messenger Conference. Design and expected performance of a novel hybrid detector for very-high-energy gamma astrophysics. (Russia).

8. Towards a large field-of-view TeV experiment in the South.Large Array Telescope for Transient and Energetic Sources (LATTES).(Brazil).

II b Work With Students

1. M.SC. advisor - Davide Romagnoli. Characterization of an RPC-type Muon detector for the MARTA high-energy cosmic ray experiment. - Università degli Studi di Milano, Centro Brasileiro de Pesquisas Físicas. (concluded)

2. Ph.D. advisor - Bruno Fontes Souto. Studies of the array layout for the Cherenkov Telescope Array. - Centro Brasileiro de Pesquisas Físicas, CAPES. (2013-17)

3. Ph.D. advisor - Saulo Ramalho. Estudo em polarimetria óptica de jatos relativísticos de blazares. Tese (Doutorado em Doutorado em Física-CBPF) - Centro Brasileiro de Pesquisas Físicas, CAPES. (2016-)

II c Diploma thesis supervision

1. Priscilla Behar Jorge. Estudo do Fenômeno de QPO em Blazares VHE. - Centro Brasileiro de Pesquisas Físicas, CAPES. (2016-17)

II d Other Teaching Duties

1. Mini-course at IFCE / Ceará - "High-Energy Gamma-ray Astrophysics"

II e. Work With Postdocs

1. Post-doc supervision - Bernardo Fraga. Centro Brasileiro de Pesquisas Físicas, FAPERJ (2016-)

III. Service activities

III a. Within ICRANet

1. Coordination of the Brazilian Science Data Center (BSDC).

III b. Outside ICRANet

1. Post-graduate course at CBPF - "Introduction to Astroparticle Physics"

IV. Other

2016 List of Publication

Barres de Almeida, U.. TeV Astrophysics: Probing the Relativistic Universe. World Scientific Research, 2017. (in press)

ASSIS, P. ; **Barres de Almeida, U.** ; et al. Design and expected performance of a novel hybrid detector for very-high-energy gamma astrophysics. Astroparticle Physics, 2016. (submitted)

Barres de Almeida, U.; JERMAK, H. ; STEELE, I. ; et al. The RINGO2 and DIPOL Optical Polarisation Catalogue of Blazars. MNRAS 2016. (in press)

For a complete list, please see my Google Scholar profile:
https://scholar.google.com.br/citations?hl=en&user=asoaK5UAAAAJ&view_op=list_works&sortby=pubdate

Belinski Vladimir

Position: ICRANet, Faculty Member

Period covered: December 2015 -December 2016

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 is 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 2015-2016 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
i) both of these problems was solved for the 2-d extended N=16 supergravity,
ii) alongside, there was constructed the general (not necessary supersymmetric) extension of the pure gravity ISM to the case when fermionic fields are presented.

The corresponding paper has been published in arXiv and will be submitted to the Physical Review D, reference [1].

2. Main part of scientific work during 2016 have been dedicated to the writing the final parts of the book "Cosmological Singularity" (V.Belinski and M.Henneaux). Now (November 2016) the book is finished and will be send to CUP in January 2017. The book will be published also in 2017.

II Conferences and educational activities

Conferences:
1) First International Conference "Singularities of General Relativity and their quantum fate", Institute of Mathematics, Polish Academy of Sciences, Banach Mathematical Center, Warsaw (Poland), June 27-July 1, 2016. Invited talk "The generic inhomogeneous Big-Bang with isotropic expansion" (slides and video talk available online).

2) International Conference "An Adriatic Workshop" ICRANet, Pescara (Italy), June 20-June 30, 2016. Invited talk "Integrable SUGRA".

III Publications

[1] V. Belinski "On the integrable gravity coupled to fermions", arXiv:1611.02924, will be submitted to Phys. Rev. D.

Bianco Carlo Luciano

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

Period covered: 2005 – 2016

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 Alessando Massucci, Federica Volpi.

- Students of the Final Degree Thesis ("Tesi di Laurea Vecchio Ordinamento") in Physics at University "La Sapienza", Rome, Italy: Letizia Caito, Walter Ferrara, Laura Rosano.

II c Diploma thesis supervision

- 2005. External supervisor of the First three years degree thesis ("Tesi di laurea triennale") in Physics by Francesco Alessandro Massucci at University "La Sapienza", Rome, Italy.

- 2006. External supervisor of the Degree thesis in Physics by Letizia Caito at University "La Sapienza", Rome, Italy.

- 2007. Thesis advisor of the IRAP-PhD Degree Thesis by Maria Grazia Bernardini at University "La Sapienza", Rome, Italy.

- 2008. External supervisor of the First three years degree thesis ("Tesi di laurea triennale") in Physics by Eliana La Francesca at University "La Sapienza", Rome, Italy.

- 2008. Thesis advisor of the IRAP-PhD Degree Thesis by Roberto Guida at University "La Sapienza", Rome, Italy.

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

II d Other Teaching Duties

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

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

Ruffini, R.; Muccino, M.; Aimuratov, Y.; Bianco, C. L.; Cherubini, C.; Enderli, M.; Kovacevic, M.; Moradi, R.; 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; ApJ, in press (2016), arXiv:1607.02400.

Ruffini, R.; Rueda, J. A.; Muccino, M.; Aimuratov, Y.; Becerra, L. M.; Bianco, C. L.; Kovacevic, M.; Moradi, R.; Oliveira, F. G.; Pisani, G. B.; Wang, Y.; On the classification of GRBs and their occurrence rates; ApJ, in press (2016), arXiv:1602.02732.

Becerra, L.; Bianco, C. L.; Fryer, C. L.; Rueda, J. A.; Ruffini, R.; On the induced gravitational collapse scenario of gamma-ray bursts associated with supernovae; ApJ, in press (2016), arXiv:1606.02523.

Pisani, G. B.; Ruffini, R.; Aimuratov, Y.; Bianco, C. L.; Kovacevic, M.; Moradi, R.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Shakeri, S.; Wang, Y.; On the universal late X-ray emission of binary-driven hypernovae and its possible collimation; ApJ, in press (2016), arXiv:1610.05619.

Simonetta Filippi

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

-ECCOMAS Congress , VII European Congress on Computational Methods in Applied Sciences and Engineering, Crete, Greece, June 5-10 2016.

-2016 Conference on Complex Systems, Beurs Van Berlage, Amsterdam, The Netherlands, 19-22 September 2016.

II b Work With Students

Prof Filippi, together with Prof. C. Cherubini is working with the ICRANet PhD students Rahim Moradi and Wang Yu on problems of black hole plasma magnetohydrodynamics around rotating black holes. Moreover they are both working with Dr Federico Cipolletta, a former IRAP PhD student, on numerical methods for rotating and self-gravitating classical fluid equilibrium configurations with multi-parametric rotation laws.

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

Prof. Filippi serves as supervisor for IRAP PhD students.

III b. Outside ICRANet

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

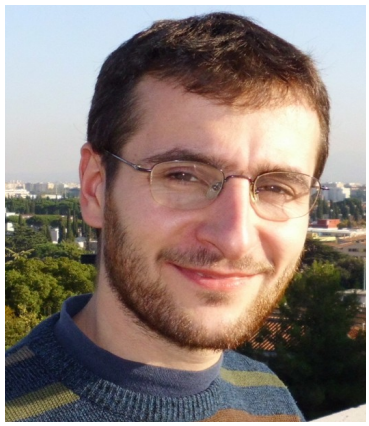
IV. Other

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 Prof. Christian Cherubini, Dr Jorge Rueda, Dr Andrea Geralico and Dr Donato Bini she has been involved in research activities in the fields of Stellar and Galactic Structures, Effective Geometries and Complex Systems in Nature.

2016 List of Publications

- Nestola, M.G.C., Faggiano, E., Vergara, C., Lancellotti, R.M., Ippolito, S., Antona, C., Filippi, S., Quarteroni, A., Scrofani, R. , "Computational comparison of aortic root stresses in presence of stentless and stented aortic valve bio-prostheses", (2016) Computer Methods in Biomechanics and Biomedical Engineering, in press.
- Cherubini C. and Filippi S., Commun. Comput. Phys. 19, (2016), 758-769.
- Nestola, M.G.C., Gizzi, A., Cherubini, C., Filippi, S., International Journal of Modern Physics C 27 (2) (2016), 1650017.

Marco Muccino



Position: PhD
Period covered: 2010/2014
Position: Post-Doc
Period covered: 2014/2016

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 contest 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)

24) "Supernovae, Hypernovae and Binary Driven Hypernovae", An Adriatic Workshop, June 20th–30th, Pescara (Italy)

II b. Work With Students:

Internal seminars and supervision of data analysis with the IRAP-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"

7) *Lectures: IRAP Ph.D. Erasmus Mundus school, May 30th–June 2nd, 2016 Nice (France)*

"Classification of long and short bursts and their rate of occurrence"

III b. Outside ICRANet

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

December 2015. Collaboration with Dr. Kuantay Boshkayev in Almaty (Kazakhstan).

February – September 2016. Collaboration with Dr. Luca Izzo.

IV. List of Publications, 2014–2016

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. Penacchoni, 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 Wm from gamma-ray bursts", A&A, 582, A115 (2015); L. Izzo, M. Muccino, E. Zaninoni, L. Amati, M. Della Valle.

16) "On the occurrence rate of short and long GRBs", ApJ (in press), arXiv:1602.02732 (2016); R. Ruffini, J. A. Rueda, M. Muccino, L. M. Becerra, G. B.Pisani, M. Kovacevic, Y. Wang, Y. Aimuratov, C. L. Bianco, R. Moradi, F. G. Oliveira.

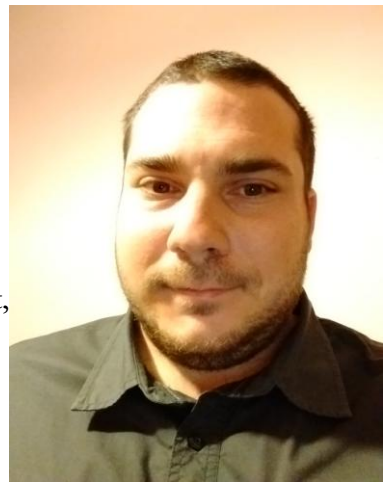
17) "GRB 090510: a genuine short GRB from a binary neutron star coalescing into a Kerr-Newman black hole", ApJ (in press), arXiv:1607.02400 (2016); R. Ruffini, M. Muccino, Y. Aimuratov, C. L. Bianco, C. Cherubini, M. Enderli, M. Kovacevic, R. Moradi, A. V. Penacchioni, G. B. Pisani, J. A. Rueda, Y. Wang.

18) *"Theoretical and observational constraints on the mass-radius relations of neutron stars", arXiv:1606.07804 (2016); K. Boshkayev, J. A. Rueda, M. Muccino.*

19) *"Main parameters of neutron stars from quasi-periodic oscillations in low mass X-ray binaries", arXiv:1604.02398 (2016); K. Boshkayev, J. A. Rueda, M. Muccino.*

20) *"On the rate and on the gravitational wave emission of short and long GRBs", arXiv:1602.03545 (2016);* R. Ruffini, J. Rodriguez, M. Muccino, J. A. Rueda, Y. Aimuratov, U. Barres de Almeida, L. Becerra, C. L. Bianco, C. Cherubini6, S. Filippi, D. Gizzi, M. Kovacevic, R. Moradi, F. G. Oliveira, G. B. Pisani, Y. Wang.

Pisani Giovanni Battista



Position: Post-Doc Researcher

Institution: Sapienza University of Rome, Rome, Italy and ICRANet, Pescara, Italy

Period covered: 1st April 2015 – Today

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~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 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) "2rd 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

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities

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;

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;

3) "2nd Bego Rencontres", Nice, France, 16th – 31st May, 2013; Lecture: A new subclass of energetic GRB-SN sources: The IGC GRB-SN family;

4) "Erasmus Mundus School", Nice, France, 3rd – 20th September, 2013; Lecture: A new subclass of energetic GRB-SN sources: The IGC GRB-SN family;

5) "Erasmus Mundus School", Nice, France, 23rd - 27th February, 2014; Lecture 1: GRBs-SNe within the Induced Gravitational Collapse model; Lecture 2: The role of the High Energy in short and long GRBs;

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;

7) "3rd Bego Rencontres", Nice, France, 8th – 19th September, 2014; Lecture: Energetic GRBs-SNe within the Induced Gravitational Collapse.

III b. Outside ICRANet

Teaching activity as assistant of Professor Valerio Parisi in his Physics classes for Medical Science students, Sapienza University of Rome; academic years 2015/2016 and 2016/2017.

IV. Other

List of Publications

Scientific papers published on refereed Journals (14)

Pisani, G. B.; Ruffini, R.; Aimuratov, Y.; Bianco, C. L.; Kovacevic, M.; Moradi, R.; Muccino, M.; Penacchioni, A. V.; Rueda, J. A.; Shakeri, S.; Wang, Y., ``On the universal late X-ray emission of binary-driven hypernovae and its possible collimation", 2016, ApJ in press;

Ruffini, R.; Rueda, J. A.; Muccino, M.; Aimuratov, Y.; Becerra, L. M.; Bianco, C. L.; Kovacevic, M.; Moradi, R.; Oliveira, F. G.; **Pisani, G. B.**; Wang, Y., ``On the classification of GRBs and their occurrence rates", 2016, ApJ in press;

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 090510: a genuine short-GRB from a binary neutron star coalescing into a Kerr-Newman black hole', 2016, ApJ in press;

Luongo, O.; **Pisani, G. B.**; Troisi, A, ``Cosmological degeneracy versus cosmography: a cosmographic dark energy model", 2016, International Journal of Modern Physics D;

Luongo, O.; **Pisani, G. B.**; Quevedo, H., ``Cardy-Verlinde entropy in Hořava-Lifshitz gravity", 2016, Physical Review D, 93, 6;

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;

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-wavelenght Analysis of an Induced Gravitational Collapse Event", 2015, ApJ, 798, 10;

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, Arep, 59, 626;

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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.; 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;

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;

Penacchoni, 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;

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;

Scientific papers submitted to refereed Journals or in preparation (2)

Ruffini, R.; Rodriguez, J.; Muccino, M.; Rueda, J. A.; Aimuratov, Y.; Barres de Almeida, U.; Becerra, L.; Bianco, C. L.; Cherubini, C.; Filippi, S.; Gizzi, D.; Kovacevic, M.; Moradi, M.; Oliveira, F. G., **Pisani, G. B.**; Wang, Y., ``On the rate and on the gravitational wave emission of short and long GRBs", to be submitted to ApJ;

Ruffini, R.; Wang, Y.; Shakeri, S.; Kovacevic, M.; Muccino, M.; **Pisani, G. B.**; Aimuratov, Y.; Becerra, L. M.; Bianco, C. L.; Moradi, R.; Rueda, J. A., ``X-ray flares in early gamma-ray burst afterglow", to be submitted to ApJ;

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.

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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;

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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;

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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.

Brian Punsly

Position: Research Scientist
Period covered: 10/2015-10/2016

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 2015-2016. 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. **The Relativistic Jet-Accretion Flow-Wind Connection in Mrk 231**

I led an international effort to study Mrk 231 during a radio flare with the highest resolution radio interformotry 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). The paper has been very favorable reviewed by ApJ and is in the revision stage

ABSTRACT

Long term radio monitoring of the broad absorption line quasar, Mrk\,231, at 17.6 GHz detected a strong flare in 2015. This triggered four epochs of Very Long Baseline Array (VLBA) observations from 8.4 GHz to 43 GHz as well as three epochs of X-ray observations with NuSTAR and two with XMM over a 15 week period. Two ejected components were detected by the VLBA observations. A conservative lower bound on the apparent speed of the first ejection is attained by assuming that it was ejected when the flare began, v_{app} >3.15c. Serendipitous far UV Hubble Space Telescope observations combined with our long term radio monitoring seem to indicate that episodes of relativistic ejections suppress flux that is emitted at wavelengths shortward of the peak of the far UV spectral energy distribution, similar to what has been observed in radio loud quasars. Episodes of strong jet production also seem to suppress the high ionization broad absorption line wind seen in weak jet states. We found a statistically significant increase (~24%) of the 3-12 keV flux during the radio flare relative to a

quiescent radio state. This is explained by an ultra-fast (~0.06$) X-ray absorbing photo-ionized wind that is significantly detected only in the low radio state (similar to Galactic black holes). Mrk~231 is becoming more radio loud. We found that the putative parsec scale radio lobe doubled in brightness in 9 years. Furthermore, large flares are more frequent with 3 major flares occurring at ~2 year intervals..

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. The extreme ultraviolet spectra of low-redshift radio-loud quasars

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),

ABSTRACT:

This paper reports on the extreme ultraviolet (EUV) spectrum of three low redshift (z ~ 0.6) radio loud quasars, 3C 95, 3C 57 and PKS 0405-123. The spectra were obtained with the Cosmic Origins Spectrograph (COS) of the Hubble Space Telescope. These are all high Eddington ratio quasars. The bolometric thermal emission, L_{bol}, associated with the accretion flow is estimated to be at least the Eddington limit for PKS 0405-123 and just below the Eddington limit for 3C 57. 3C 95 also has a large Eddington ratio, ~40\% We estimate the long term time averaged jet power, Q, for the three sources. Q/, L_{bol} is shown to lie along the correlation of Q/, L_{bol} and α_{EUV} found in previous studies of the EUV continuum of intermediate and high redshift quasars, where the EUV continuum flux density between 1100 Å and 700 Å is defined by $F_{\upsilon} \sim \upsilon^{-\alpha EUV}$. The high Eddington ratios of the three quasars extends the analysis into a wider parameter space. Selecting quasars with high Eddington ratios has accentuated the statistical significance of the partial correlation analysis of the data. Namely. the correlation of Q/, L_{bol} and α_{EUV} is fundamental and the correlation of Q/ and α_{EUV} is spurious at a very high statistical significance level (99.8\%). This supports the regulating role of ram pressure of the accretion flow in magnetically arrested accretion models of jet production. In the process of this study, we use multi-frequency and multi-resolution. Very Large Array radio observations to determine that one of the bipolar jets in 3C 57 is likely frustrated by galactic gas that keeps the jet from propagating outside the host galaxy

3B. The Extreme Ultraviolet Variability of Quasars

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 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), Shaohua Zhang Antarctic Astronomy Division Polar Research Institute of China 451, Jinqiao Rd., Shanghai, China and Sowgat Muzahid The Pennsylvania State University, State College, PA 16802 , USA.

ABSTRACT:

We study the extreme ultraviolet (EUV) variability (rest frame wavelengths 500 - 920 Å) of high luminosity quasars using HST (low to intermediate redshift sample) and SDSS (high redshift sample) archives. The combined HST and SDSS data indicates a much more pronounced variability when the sampling time between observations in the quasar rest frame is 2 x 10^7 sec compared to < 1.5 x 10^7 sec. Based on an excess variance analysis, for time intervals < 2 x 10^7 sec in the quasar rest frame, 10\% of the quasars (4/40) show evidence of EUV variability. Similarly, for time intervals >2 x 10^7 sec in the quasar rest frame, 55\% of the quasars (21/38) show evidence of EUV variability. The propensity for variability does not show any statistically significant change between 2.5 x 10^7 sec and 3.16 x 10^7 sec (1 yr). The temporal behavior is one of a threshold time interval for significant variability as opposed to a gradual increase on these time scales. A threshold time scale can indicate a characteristic spatial dimension of the EUV region. We explore this concept in the context of the slim disk models of accretion. We find that for rapidly spinning black holes, the radial infall time to the plunge region of the optically thin surface layer of the slim disk that is responsible for the preponderance of the EUV flux emission (primarily within 0 - 7 black hole radii from the inner edge of the disk) is consistent with the empirically determined variability time scale.

3C. The The Detection of Diffuse Extended Structure in 3C273: Implications for Jet Power.

This work was performed with Preeti Kharb (Indian Institute of Astrophysics, II Block, Koramangala, Bangalore).

ABSTRACT: We present deep Very Large Array imaging of 3C 273 in order to determine the diffuse, large scale radio structure of this famous radio-loud quasar. Diffuse extended structure (radio lobes) is detected for the first time in these observations as a consequence of high dynamic range in the 327.5 and 1365 MHz images. This emission is used to estimate a time averaged jet power, 7.2 x 10^{43} ergs/s < Q < 3.7 x 10^{44} ergs/s. Brightness temperature arguments indicate consistent values of the time variability Doppler factor and the compactness Doppler factor for the inner jet, $\delta > 10$. Thus, the large apparent broadband bolometric luminosity of the jet, ~3 x 10^{46} ergs/s, corresponds to a modest intrinsic , ~3 x 10^{42} ergs/s or ~ 1\% of Q. In summary, we find that 3C 273 is actually a ``typical'' radio loud quasar contrary to suggestions in the literature. The modest Q is near the peak of the luminosity distribution for radio loud quasars and it is consistent with the current rate of dissipation emitted from millimeter wavelengths to gamma rays. The extreme core-jet morphology is an illusion from a near pole-on line of sight to a highly relativistic jet that produces a Doppler enhanced glow that previously swamped the lobe emission. 3C 273 apparently has the intrinsic kpc scale morphology of a classical double radio source, but it is distorted by an extreme Doppler aberration.

4. Jets from Stellar Mass Black Holes

4A. A Temporal Analysis Indicates a Mildly Relativistic Compact Jet in GRS 1915+105

This continues a line of research with Jerome Rodriguez Laboratoire AIM, CEA/DRF-CNRS-Universit\'{e} Paris Diderot, IRFU SAp, F-91191 Gif-sur-Yvette, France

ABSTRACT:

Most of our knowledge of the radio morphology and kinematics of X-ray binary partially synchrotron self-absorbed compact jets (hereafter compact jets) is based on the observations of GRS~1915+105 which has the most prominent compact jet. Yet, the compact jet bulk velocity, v, is poorly constrained in the literature, $0.07 < v/c < 0.98$. In spite of this uncertainty, compact jets are often unified with relativistic jets in active galactic nuclei. We have estimated v as part of a temporal analysis of GRS~1915+105 jets in ``high plateau states" (HPS). We define the HPS as a state showing a hard X-ray spectrum and low level of long-term (>10s) X-ray activity associated with 15 GHz flux density >70 mJy for >7 consecutive days. The radio emission is associated with compact jet emission. Two HPS were monitored at 15 GHz during their termination with e-folding times of 3.8 hrs and 8.6 hrs. We combine this time scale with the scale of spatial variation of the linear source of a VLBA image preceding the fade of one of these HPS in order to estimate the jet speed. Our assumption that the reduction in radio emissivity propagates as an approximate discontinuity down the HPS jet (leaving a weak jet in its wake) indicates $0.17 < v/c < 0.43$. This agrees closely with the only other existing v estimates that are derived directly from radio images, jet asymmetry produced by Doppler enhancement.

4A. A Temporal Analysis Indicates a Mildly Relativistic Compact Jet in GRS 1915+105

This continues a line of research with Jerome Rodriguez Laboratoire AIM, CEA/DRF-CNRS-Universit\'{e} Paris Diderot, IRFU SAp, F-91191 Gif-sur-Yvette, France and Sergei A. Trushkin Special Astrophysical Observatory RAS, Nizhnij Arkhyz, 369167, Russia and Kazan FederalUniversity, Kazan, 420008 Russia

ABSTRACT:

The microquasar GRS~1915+105 is known for its spectacular discrete ejections. They occur unexpectedly, thus their inception escapes direct observation. It has been shown that the X-ray flux increases in the hours leading up to a major ejection. In this article, we consider the serendipitous interferometric monitoring of a modest version of a discrete ejection described in Reid et al. (2014) that would have otherwise escaped detection in daily radio light curves. The observation begins ~1 hour after the onset of the ejection, providing unprecedented accuracy on the estimate of the ejection time. The astrometric measurements allow us to determine the time of ejection as MJD $56436.274^{+0.016}_{-0.013}$ i.e., within a precision of 41 minutes (95 % confidence). Just like larger flares, we find that the X-ray luminosity increases in last 2 - 4 hours preceding ejection. Our finite temporal resolution indicates that this elevated X-ray flux persists within $21.8^{+22.6}_{-19.1}$ minutes of the ejection with 95% confidence, the highest temporal precision of the X-ray - superluminal ejection connection to date. This observation provides direct evidence that the physics that launches major flares occurs on smaller scales as well (lower radio flux and shorter ejection episodes). The observation of a X-ray spike prior to a discrete

ejection, although of very modest amplitude suggests that the process linking accretion behavior to ejection is general from the smallest scales to high luminosity major superluminal flares.

4C. General Relativistic Considerations of the Field Shedding Model of Fast Radio Bursts

Performed with ICRANet colleague Donato Bini.

ABSTRACT:

Popular models of fast radio bursts (FRBs) involve the gravitational collapse of neutron star progenitors to black holes. It has been proposed that the shedding of the strong neutron star magnetic field (B) during the collapse is the power source for the radio emission. Previously, these models have utilized the simplicity of the Schwarzschild metric which has the restriction that the magnetic flux is magnetic ``hair'' that must be shed before final collapse. But, neutron stars have angular momentum and charge and a fully relativistic Kerr Newman solution exists in which B has its source inside of the event horizon. In this letter, we consider the magnetic flux to be shed as a consequence of the electric discharge of a metastable collapsed state of a Kerr Newman black hole. It has also been argued that the shedding model will not operate due to pair creation. By considering the pulsar death line, we find that for a neutron star with B = 10^{11} - 10^{13} G and a long rotation period, >1 s this is not a concern. We also discuss the observational evidence supporting the plausibility of magnetic flux shedding models of FRBs that are spawned from rapidly rotating progenitors.

5. Numerical Simulations of Black Hole Magnetosphere.

This line of research is designed to help reform the current numerical movement in numerical work. It was performed with the Notre Dame University numerical team, Dinshaw Balsara, Jinho Kimand Sudip Garain

5A**. Riemann solvers and Alfven waves in black hole magnetospheres**.

ABSTRACT:

In the magnetosphere of a rotating black hole, an inner Alfven critical surface (IACS) must be crossed by inflowing plasma. Inside the IACS, Alfven waves are inward directed toward the black hole. The majority of the proper volume of the active region of spacetime (the ergosphere) is inside of the IACS. The charge and the totally transverse momentum flux (the momentum flux transverse to both the wave normal and the unperturbed magnetic field) are both determined exclusively by the Alfven polarization. Thus, it is important for numerical simulations of black hole magnetospheres to minimize the dissipation of Alfven waves. Elements of the dissipated wave emerge in adjacent cells regardless of the IACS, there is no mechanism to prevent Alfvenic information from crossing outward. Thus, numerical dissipation can affect how simulated magnetospheres attain the substantial Goldreich-Julian charge density associated with the rotating magnetic field. In order to help minimize dissipation of Alfven waves in relativistic numerical simulations we have formulated a one-dimensional Riemann solver, called HLLI, which incorporates the Alfven discontinuity and the contact discontinuity. We have also formulated a multidimensional Riemann solver, called MuSIC, that enables low dissipation propagation of Alfven waves in multiple dimensions. The importance of higher order schemes in lowering the numerical dissipation of Alfven waves is also catalogued.

2016 List of Publication

Punsly, Brian; Rodriguez, Jérôme A Temporal Analysis Indicates a Mildly Relativistic Compact Jet in GRS 1915+105 2016 ApJ 833 54

Punsly, Brian; Bini, Donato, General relativistic considerations of the field shedding model of fast radio bursts 2016 MNRAS Lett. 41

Punsly, Brian; Rodriguez, Jérôme; Trushkin, Sergei A.., The Accretion Flow-Discrete Ejection Connection in GRS 1915+105 2016 ApJ 826 5

Punsly, Brian; Reynolds, Cormac; Marziani, Paola; O'Dea, Christopher P., The extreme ultraviolet spectra of low-redshift radio-loud quasars 2016 MNRAS 459 4233

Punsly, Brian; Marziani, Paola; Zhang, Shaohua; Muzahid, Sowgat; O'Dea, Christopher P., The Extreme Ultraviolet Variability of Quasars 2016 ApJ http://dx.doi.org/10.3847/0004-637X/830/2/104

Punsly, Brian; Balsara, Dinshaw; Kim, Jinho; Garain, Sudip, Riemann solvers and Alfven waves in black hole magnetospheres. 2016 Computational Astrophysics and Cosmology, 3, 5

Punsly, Brian; Kharb, Preeti.. The Detection of Diffuse Extended Structure in 3C~273: Implications for Jet Power 2016 ApJ in press

Rueda Hernández, Jorge Armando

Position:
Faculty Professor at ICRANet
Member of ICRANet Faculty
IRAP PhD Faculty
Period covered: 2011-Present

I Scientific Work

I perform research in the following topics:

- Nuclear and atomic astrophysics.
- Physics and astrophysics of white dwarfs and neutron stars.
- Radiation mechanisms of white dwarfs and neutron stars.
- Gamma-ray busts theory.
- Accretion disks, hypercritical accretion processes.
- Neutrino emission from astrophysical sources.
- Gravitational waves.
- Exact solutions of the Einstein and Einstein-Maxwell equations in astrophysics.
- Critical electromagnetic fields and non-linear electrodynamics effects in astrophysics.
- Distribution of dark matter in galaxies and cosmological implications.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

In the year 2016 I presented lectures/talks in the following conferences/meetings/workshops:

- "IV Congresso Nazionale GRB", 8-11 November 2016, Bergamo (Italy).
- "La notte europea dei ricercatori", 30 September 2016, Pescara (Italy).
- "Adriatic Workshop: Supernovae, Hypernovae and Binary Driven Hypernovae", June 20-30, Pescara (Italy) 2016.
- "Fourth Bego Rencontres", IRAP Ph.D. Erasmus Mundus School, 30 May-3 June 2016, Nice (France).

II b Work With Students

- Current scientific collaboration with the following students of the IRAP-PhD program at Sapienza University of Rome, Italy: Juan David Uribe, Jose Fernando Rodriguez, Laura Becerra, Gabriel Gomez, Diego Leonardo Caceres Uribe, Milos Kovacevic and Yu Wang.

- Current scientific collaboration with the following students of the IRAP-PhD program at Bremen University, Germany: Paul Jefremow.
- Current scientific collaboration with the following undergraduate (last year) Physics students Sapienza University of Rome, Italy: Davide Gizzi and Silvia Petroni.

II c Diploma thesis supervision

I list below the undergraduate theses which I have supervised.

- Undergraduate Thesis of Davide Gizzi 2016, Sapienza University of Rome, Italy: "Gravitational wave emission of compact object binary mergers within the effective one-body formalism"

Scientific Production:

- R. Ruffini, J. F. Rodriguez, M. Muccino, J. A. Rueda, et al., "On the rate and on the gravitational wave emission of short and long GRBs", arXiv:1602.03545.

- Undergraduate Physics thesis of Silvia Petroni 2016, Sapienza University of Rome, Italy: "Hypercritical neutrino-colled accretion onto black holes".

I list below the PhD theses which I have supervised and the ones currently under my supervision. They are distributed in the seven topics listed above in the section I. I also include some scientific production that derived from these PhD researches.

- PhD thesis of Juan David Uribe 2015-2018, Sapienza University of Rome, Italy. Topics: 1-4. Fellowship: IRAP-PhD

Scientific Production:

- L. Becerra, M. Guzzo, J. A. Rueda, R. Ruffini, J. D. Uribe, "Neutrino oscillations in the induced gravitational collapse paradigm of gamma-ray bursts", in preparation.
- M. Guzzo, J. A. Rueda, R. Ruffini, J. D. Uribe, "Detectability of hypercritical accretion neutrino emission in the induced gravitational collapse paradigm of gamma-ray bursts", in preparation.

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

Scientific Production:

- R. Ruffini, J. F. Rodriguez, M. Muccino, J. A. Rueda, et al., "On the rate and on the gravitational wave emission of short and long GRBs", arXiv:1602.03545.
- J. F. Rodriguez, J. A. Rueda, and R. Ruffini, "What can we really infer from GW 150914? (II)"; arXiv: 1605.07609.
- J. F. Rodriguez, J. A. Rueda, and R. Ruffini, "What can we really infer from GW 150914?"; arXiv:1605.04767.

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

Scientific Production:

- L. Becerra, M. Guzzo, J. A. Rueda, R. Ruffini, J. D. Uribe, "Neutrino oscillations in the induced gravitational collapse paradigm of gamma-ray bursts", in preparation.
- R. Ruffini, J. F. Rodriguez, M. Muccino, J. A. Rueda, et al., "On the rate and on the gravitational wave emission of short and long GRBs", submitted; arXiv:1602.03545.
- L. Becerra, J. A. Rueda, P. Lorén-Aguilar, E. García-Berro, "The Spin Evolution of Fast-Rotating, Magnetized Super-Chandraskehar White Dwarfs in the Aftermath of White Dwarf Mergers", submitted.
- R. Ruffini, J. A. Rueda, M. Muccino, Y. Aimuratov, L. M. Becerra, et al., "On the classification of GRBs and their occurrence rates," ApJ, in press; arXiv:1602.02732.
- L. Becerra, C. L. Bianco, C. L. Fryer, J. A. Rueda, and R. Ruffini, "On the induced gravitational collapse scenario of gamma-ray bursts associated with supernovae", ApJ, in press; arXiv: 1606.02523.
- 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. G. Gomez, C. R. Arguelles, P. Volker, J. A. Rueda, R. Ruffini, "Strong lensing by fermionic dark matter in galaxies", submitted; arXiv:1610.03442.
- L. G. Gomez and J. A. Rueda, "The Role of the Dark Matter Distribution in the Structure Formation", Proc. Second César Lattes Meeting 2016.

- 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, "Neutron-Star-Black-Hole Binaries Produced by Binary-Driven Hypernovae", Phys. Rev. Lett., vol. 115, p. 231102, Dec. 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, 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:

- D. L. Caceres, S. M. de Carvalho, J. G. Coelho, R. C. R. de Lima, J. A. Rueda, "Thermal X-ray emission from massive, fast rotating, highly magnetized white dwarfs", submitted.
- Jaziel G. Coelho, D. L. Caceres, R. C. R. de Lima, M. Malheiro, J. A. Rueda, R. Ruffini "On the nature of some SGRs and AXPs as rotation-powered neutron stars", A&A, accepted.
- 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.
- D. L. Caceres, 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 Stratified 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 galactic observables", submitted; arXiv:1606.07040.
- C. R. Arguelles, N. E. Mavromatos, J. A. Rueda, and R. Ruffini, "The role of self-interacting right-handed neutrinos in galactic structure," JCAP, vol. 4, p. 038, Apr. 2016.
- 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. Arg□uelles, 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", Prof. 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-Sigu_an, 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

I have active scientific collaborations with the following professors/researches:

- In Argentina: Carlos R. Arguelles at UNLP (La Plata).
- In Brazil: Ulisses Barres de Almeida and Sergio B. Duarte at CBPF (Rio de Janeiro); R. Negreiros at UFF (Niterói); Débora P. Menezes at UFSC (Florianópolis); S. O. Kepler and C. A. Z. Vasconcellos at UFRGS (Porto Alegre); R. Marinho Jr and M. Malheiro at ITA (São José dos Campos); Marcelo Guzzo and Fernando Torres at Unicamp (Campinas); Luis J. Rangel-Lemos and Sheyse M. de Carvalho at UFT (Palma); Rafael Rodrigues de Lima at UDESC (Florianópolis); Jonas P. Pereira at UFABC (Santo André); Jaziel G. Coelho at INPE (São José dos Campos).
- In Colombia: Luis Nuñez and Guillermo González at UIS (Bucaramanga); Leonardo A. Pachón and Antonio Enea Romano at UdeA (Medellín); César A. Valenzuela at Univalle (Cali).
- In England: Nikolaos Mavromatos at King College London (London); Pablo Lorén-Aguilar at Exeter University (Exeter).
- In Germany: Volker Perlick at University of Bremen (Bremen).
- In Kazakhstan: Kuantay Boshkayev at Al-Farabi Kazakh National University (Almaty).
- In Mexico: Hernando Quevedo at UNAM (México D. F.).
- In Spain: Enrique García-Berro at UPC (Barcelona); Luis Herrera Cometta at University of Salamanca (Salamanca).

- In USA: Chris L. Fryer at LANL (New Mexico); G. Mathews at UND (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:

- D. L. Caceres, S. M. de Carvalho, J. G. Coelho, R. C. R. de Lima, J. A. Rueda, "Thermal X-ray emission from massive, fast rotating, highly magnetized white dwarfs", submitted.
- Jaziel G. Coelho, D. L. Caceres, R. C. R. de Lima, M. Malheiro, J. A. Rueda, R. Ruffini "On the nature of some SGRs and AXPs as rotation-powered neutron stars", A&A, accepted.

- 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:

- D. L. Caceres, S. M. de Carvalho, J. G. Coelho, R. C. R. de Lima, J. A. Rueda, "Thermal X-ray emission from massive, fast rotating, highly magnetized white dwarfs", submitted.
- 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:

- D. L. Caceres, S. M. de Carvalho, J. G. Coelho, R. C. R. de Lima, J. A. Rueda, "Thermal X-ray emission from massive, fast rotating, highly magnetized white dwarfs", submitted.
- Jaziel G. Coelho, D. L. Caceres, R. C. R. de Lima, M. Malheiro, J. A. Rueda, R. Ruffini "On the nature of some SGRs and AXPs as rotation-powered neutron stars", A&A, accepted.
- 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.

III. Service activities

III a. Within ICRANet

- Coordinator of the CAPES-ICRANet Program 2013-2016
- Member of the IRAP- PhD Faculty
- Local organizer of the "Adriatic Workshop: Supernovae, Hypernovae and Binary Driven Hypernovae", June 20-30, Pescara (Italy) 2016. <www.icranet.org/am/>

III b. Outside ICRANet

Journal Referee:

- European Journal of Physics
- Astrophysics and Space ScienceResearches in Astronomy and Astrophysics
- Canadian Journal of Physics
- Advances and Space Research
- Mathematical Reviews of the American Mathematical Society Scientific Advisor and/or Project Evaluation
- National Center of Science and Technology Evaluation, Ministry of Education and Science, Kazakhstan
- Agencia Nacional de Promoción Científica y Tecnológica and Fondo para la Investigación Científica y Tecnológica del Ministerio de Ciencia, Tecnología e Innovación Productiva, Argentina

Scientific Visits to other Insititutions

- Universidad Industrial de Santander, 12-16 December 2016, Bucaramanga (Colombia).
- Al-Farabi Kazakh National University, 20-25 November 2016, Almaty (Kazakhstan).

IV. Other

2016 List of Publication

1. R. Ruffini, J. Rodriguez, M. Muccino, J. A. Rueda, Y. Aimuratov, U. Barres de Almeida, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, D. Gizzi, M. Kovacevic, R. Moradi, F. G. Oliveira, G. B. Pisani, and Y. Wang, "On the rate and on the gravitational wave emission of short and long GRBs", ApJ (submitted); arXiv:1602.03545, 2016.
2. L. G. Gómez, C. R. Arguelles, V. Perlick, J. A. Rueda, and R. Ruffini, "Strong lensing by fermionic dark matter in galaxies", Phys. Rev. D (submitted); arXiv:1610.03442, 2016.
3. C. R. Arguelles, J. A. Rueda, and R. Ruffini, "Theoretical evidence of 50 keV fermionic dark matter from galactic observables", MNRAS (submitted); arXiv: 1606.07040, 2016.

4. L. Becerra, J. A. Rueda, P. Lorén-Aguilar, E. García-Berro, "The Spin Evolution of Fast-Rotating, Magnetized Super-Chandraskehar White Dwarfs in the Aftermath of White Dwarf Mergers", ApJ (submitted).
5. J. G. Coelho, D. L. Caceres, R. C. R. de Lima, M. Malheiro, J. A. Rueda, and R. Ruffini, "On the nature of some SGRs and AXPs as rotation-powered neutron stars", A&A (accepted), 2016.
6. D. L. Caceres, S. M. de Carvalho, J. G. Coelho, R. C. R. de Lima, and J. A. Rueda, "Thermal X-ray emission from massive, fast rotating, highly magnetized white dwarfs", MNRAS (accepted), 2016.
7. G. B. Pisani, R. Ruffini, Y. Aimuratov, C. L. Bianco, M. Kovacevic, R. Moradi, M. Muccino, A. V. Penacchioni, J. A. Rueda, S. Shakeri, and Y. Wang, "On the universal late X-ray emission of binary-driven hypernovae and its possible collimation", ApJ (accepted); arXiv:1610.05619, 2016.
8. R. Ruffini, M. Muccino, Y. Aimuratov, C. L. Bianco, C. Cherubini, M. Enderli, M. Kovacevic, R. Moradi, A. V. Penacchioni, G. B. Pisani, J. A. Rueda, and Y. Wang, "GRB 090510: a genuine short-GRB from a binary neutron star coalescing into a Kerr-Newman black hole", ApJ (accepted); arXiv:1607.02400, 2016.
9. R. Ruffini, J. A. Rueda, M. Muccino, Y. Aimuratov, L. M. Becerra, C. L. Bianco, M. Kovacevic, R. Moradi, F. G. Oliveira, G. B. Pisani, and Y. Wang, "On the classication of GRBs and their occurrence rates", ApJ (accepted); arXiv:1602.02732, 2016.
10. L. Becerra, C. L. Bianco, C. L. Fryer, J. A. Rueda, and R. Ruffini, "On the induced gravitational collapse scenario of gamma-ray bursts associated with supernovae", ApJ (accepted); arXiv: 1606.02523, 2016.
11. J. F. Rodriguez, J. A. Rueda, and R. Ruffini, "What can we really infer from GW 150914? (II)", ArXiv: 1605.07609, 2016.
12. J. F. Rodriguez, J. A. Rueda, and R. Ruffini, "What can we really infer from GW 150914?", ArXiv: 1605.04767, 2016.
13. C. R. Arguelles, N. E. Mavromatos, J. A. Rueda, and R. Ruffini, "The role of self-interacting right-handed neutrinos in galactic structures", J. Cosm. Astrop. Phys., vol. 4, p. 038, Apr. 2016.
14. K. A. Boshkayev, J. A. Rueda, B. A. Zhami, Z. A. Kalymova, and G. S. Balgymbekov, "Equilibrium structure of white dwarfs at finite temperatures", IJMPCS, vol. 41, p. 1660129, Mar. 2016.
15. K. A. Boshkayev, J. A. Rueda, and B. A. Zhami, "Rotating hot white dwarfs", in Gravitation, Astrophysics, and Cosmology (J.-P. Hsu and et al., eds.), pp. 189-190, 2016.

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, Bogotà, 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

2016 List of Publication

1. Ruffini, R., Muccino, M., Aimuratov, Y., Bianco, C. L., Cherubini, C., Enderli, M., Kovacevic, M., Moradi, R., 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"; The Astrophysical Journal, 831 (2016) 178

2. Pisani, G. B., Ruffini, R., Aimuratov, Y., Bianco, C. L., Kovacevic, M., Moradi, R., Muccino, M., Penacchioni, A. V., Rueda, J. A., Shakeri, S., & Wang, Y.; "On the universal late X-ray emission of binary-driven hypernovae and its possible collimation"; ArXiv e-prints, (2016) arXiv:1610.05619

3. Gomez, L. Gabriel, Arguelles, C. R., Perlick, Volker, Rueda, J. A., & Ruffini, R.; "Strong lensing by fermionic dark matter in galaxies"; ArXiv e-prints, (2016) arXiv:1610.03442

4. Batebi, S., Mohammadi, R., Ruffini, R., Tizchang, S., & Xue, S.-S.; "Generation of circular polarization of gamma ray bursts"; Physical Review D, 94 (2016) 065033

5. Arguelles, C. R., Rueda, J. A., & Ruffini, R.; "Theoretical evidence of 50 keV fermionic dark matter from galactic observables"; ArXiv e-prints, (2016) arXiv:1606.07040

6. Becerra, L., Bianco, C. L., Fryer, C. L., Rueda, J. A., & Ruffini, R.; "On the induced gravitational collapse scenario of gamma-ray bursts associated with supernovae"; ArXiv e-prints, (2016) arXiv:1606.02523

7. Rodriguez, J. F., Rueda, J. A., & Ruffini, R.; "What can we really infer from GW 150914? (II)"; ArXiv e-prints, (2016) arXiv:1605.07609

8. Rodriguez, J. F., Rueda, J. A., & Ruffini, R.; "What can we really infer from GW 150914?"; ArXiv e-prints, (2016) arXiv:1605.04767

9. Arguelles, C. R., Mavromatos, N. E., Rueda, J. A., & Ruffini, R.; "The role of self-interacting right-handed neutrinos in galactic structure"; Journal of Cosmology and Astro-Particle Physics, 4 (2016) 038

10. Boshkayev, Kuantay, Rueda, Jorge A., Ruffini, Remo, & Zhami, Bakytzhan; "Induced Compression of White Dwarfs by Angular Momentum Loss"; ArXiv e-prints, (2016) arXiv:1604.02393

11. Boshkayev, Kuantay, Rueda, Jorge A., Ruffini, Remo, Zhami, Bakytzhan, Kalymova, Zhanerke, & Balgimbekov, Galymdin; "Mass-radius relations of white dwarfs at finite temperatures"; ArXiv e-prints, (2016) arXiv:1604.02391

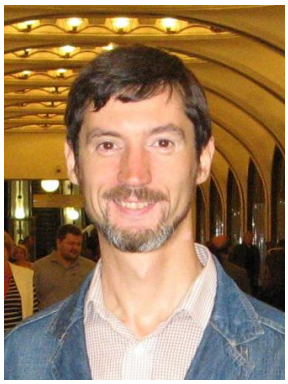
12. Ruffini, R., Rodriguez, J., Muccino, M., Rueda, J. A., Aimuratov, Y., Barres de Almeida, U., Becerra, L., Bianco, C. L., Cherubini, C., Filippi, S., Gizzi, D., Kovacevic, M., Moradi, R., Oliveira, F. G., Pisani, G. B., & Wang, Y.; "On the rate and on the gravitational wave emission of short and long GRBs"; ArXiv e-prints, (2016) arXiv:1602.03545

13. Ruffini, R., Rueda, J. A., Muccino, M., Aimuratov, Y., Becerra, L. M., Bianco, C. L., Kovacevic, M., Moradi, R., Oliveira, F. G., Pisani, G. B., & Wang, Y.; "On the classification of GRBs and their occurrence rates"; ArXiv e-prints, (2016) arXiv:1602.02732

14. Ruffini, R., Vereshchagin, G. V., & Xue, S.-S.; "Cosmic absorption of ultra high energy particles"; Astrophysics and Space Science, 361 (2016) 82

15. Ruffini, R., Aimuratov, Y., Becerra, L., Bianco, C. L., Kovacevic, M., Moradi, R., Muccino, M., Penacchioni, A. V., Pisani, G. B., Primorac, D., Rueda, J., & Wang, Y.; "GRB 160521B: Theoretical estimate of the redshift and urgent need for further x-ray observations"; GRB Coordinates Network, 19456 (2016) 1

Vereshchagin Gregory



Position: researcher
Period covered: 2016

I Scientific Work

The work focused on the following aspects:

- Photon-photon scattering and absorption of high energy photons in the Universe (with S. Shakeri)

We study the QED photon-photon scattering process between the high energy photon and a cosmic microwave background (CMB) photon. We compute the optical depth and compare it to the one for the Breit-Wheeler pair production. We show that the use of the exact cross section, instead of the approximate one adopted in the literature, leads to larger region in energies where the photon-photon scattering dominates the pair production. Implications for observations of very high energy photons are outlined.

- 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. It is shown that three-particle interactions are characterized by very anisotropic differential cross sections.

- 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.

- 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.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Supernovae, Hypernovae, and Binary Driven Hypernovae, An Adriatic Workshop, Pescara - June 20-30, 2016; talk "Cosmic absorption of high energy particles"

II b Work With Students

- S. Shakeri: on interaction of high energy photons with the background radiation in the Universe
- David Melon Fursman: on generation of multiple shocks in the GRB outflows

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

III a. Within ICRANet

- Member of the IRAP PhD Faculty
- coordination of cooperation with the Belarusian State University

- coordination of cooperation with the National Academy of Sciences of Belarus
- coordination of activities in ICRANet-Minsk center
- organizational work for the conference "Supernovae, Hypernovae, and Binary Driven Hypernovae, An Adriatic Workshop", as a member of the local organizing committee
- editorial work as co-editor for the 14th Italian-Korean Symposium on Relativistic Astrophysics
- supervision of the ICRANet newsletter
- supervision of ICRANet press releases

III b. Outside ICRANet

- Co-PI of the scientific program "Relativistic astrophysical objects and phenomena" within the Belorusian state program "Convergence-2020", subprogram "Microworld and Universe".

IV. Other

The work this year largely focused on completing the book "Relativistic Kinetic Theory With Applications in Astrophysics and Cosmology" to be published in Cambridge University Press in 2017 in co-authorship with Alexey Aksenov from ICAD, RAS. This ambitious monograph is divided into three parts. Part I presents the basic ideas and concepts of this theory; equations and methods, including derivation of kinetic equations from the relativistic BBGKY hierarchy; and discussion of the relation between kinetic and hydrodynamic levels of description. Part II introduces elements of computational physics, with special emphasis on numerical integration of Boltzmann equations and related approaches as well as multicomponent hydrodynamics. Part III presents an overview of applications ranging from covariant theory of plasma response, thermalization of relativistic plasma, and comptonization in static and moving media to kinetics of self-gravitating systems, cosmological structure formation, and neutrino emission during the gravitational collapse.

2015 List of Publication

1. G.V. Vereshchagin and A. G. Aksenov, "Relativistic Kinetic Theory With Applications in Astrophysics and Cosmology", Cambridge University Press, 2017, in press.
2. R. Ruffini, G. V. Vereshchagin and S.-S. Xue, "Cosmic absorption of ultra high energy particles", Astrophys. Space Sci. (2016) 361, 82.
3. 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 (2016).
4. G.V. Vereshchagin, S. Shakeri, "Photon-photon scattering and absorption of high energy photons in the Universe", in preparation (2016).

Xue She-Sheng

Position: ICRANet Faculty, Euro 3600/month

Period covered: Oct. 2015 -- Oct. 2016

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 preparation of the proceedings 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).
Participating preparation of parallel session contribution to the proceedings of MG14 Rome, July 2015.
Participating organization of ICRANet meetings in China: the 5th Galileo –Xu Guangqi meeting (GX5, June, 2017).

II b Work With Students

Wang Yu and Rahim Moradi (IRAP Ph.D. students), Li Liang and Luis Gabriel Gómez Díaz, XiaoFeng Yang (Erasmus Mundus Ph.D. students), David Melon Fuksman, Yu Ling Chang and Iranian Ph.D.

students Seddigheh Tizchang, Saghar Batebi and Soroush Shakeri, Rashid Riahi (supported by their nation).

II c Diploma thesis supervision (2012-2016)

Yuanbin Wu, Handrik Ludwig, Eckhard Strobel, and Clement Stahl (all are Erasmus Mundus Ph.D. students), their main publications: 8 in Phys. Rev. , and 4 in Nucl. Phys.

II d Other Teaching Duties (2012-2016)

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

II e. Work With Professors and Postdocs inside and outside ICRANet (2012-2016)

R. Ruffini, H. Kleinert, G. Vereshchagin, J. Rueda, C. Bianco, W.B. Han, I. Siutsou, C. Argulles, C. Gruber, R. Mohammadi, D. Bégué, E. Bavarsad.

III. Service activities

III a. Within ICRANet

Participating organization of ICRANet Seminars and ICRANet outreach activity.
Participating preparation of ICRANet Newsletter and ICRANet news for Hyperspce news. Working with ICRANet administration.

III b. Outside ICRANet

Visiting Chinese Institutions IHEP and ITP that are in cooperation with ICRANet .

IV. Other

The List of Publications (Oct. 2015 -- Oct. 2016)

R. Ruffini, G. Vereshchagin and S.-S. Xue, "Cosmic absorption of ultra high energy particles", Astrophysics and Space Science, Volume 361:82, 2016.
S. Batebi, R. Mohammadi, R. Ruffini, S. Tizchang, and S.-S. Xue, `` Generation of circular polarization of gamma ray bursts", Phys. Rev. D 94, 065033 (2016).
C. Stahl, E. Strobel, and S.-S. Xue, ``Fermionic current and Schwinger effect in de Sitter spacetime", Phys. Rev. D 93, 025004 (2016).
R. Mohammadi, J. Khodagholizadeh, M. Sadegh, and S.-S. Xue, ``B-mode polarization of the CMB and the cosmic neutrino background ", Phys. Rev. D93, 125029 (2016).
S.-S. Xue, `` Fermion masses of the third fermion family", Phys. Rev. D 93, 073001 (2016).
C. Stahl and S.-S. Xue, `` Schwinger effect and backreaction in de Sitter spacetime", Phys. Lett B 760, 288-292 (2016).
C. Stahl, S. Eckhard and S.-S. Xue, `` Pair creation in the early universe", the proceedings of Fourteenth Marcel Grossmann Meeting - MG14, World scientific.

T. Seddigheh, B. Saghar; M. Rohollah, R. Ruffini, G. Vereshchagin, S.-S. Xue, `` On the interaction of high energy photons with the cosmic microwave background", the proceedings of Fourteenth Marcel Grossmann Meeting - MG14, World scientific.
B. Saghar, T. Seddigheh, M. Rohollah, R. Ruffini, S.-S. Xue, `` On the interaction of high energy photons with the cosmic microwave background", the proceedings of Fourteenth Marcel Grossmann Meeting - MG14, World scientific.

Recently, we report here a work on a simple inhomogeneous cosmological model within the Lemaître-Tolman-Bondi (LTB) metric. The mass-scale function of the LTB model is taken to be $M(r) \propto r^d$ and would correspond to a fractal distribution for $0<d<3$. The luminosity distance for this model is computed and then compared to supernovae data. Unlike LTB models which have in the most general case two free functions, our model has only two free parameters as the flat standard model of cosmology. The best fit obtained is a matter distribution with an exponent of $d=3.44$. Finally by adding an upper cutoff on the scale $r=2 300$ Mpc, we find a better fit than the simple fractal model with an exponent $d=3.36$. For some details, see the reference, C. Stahl, R. Ruffini, the conference proceedings of the 15th Italian and Korean meeting, Pescara Italy July, 2016, World scientific, Singapore. The proceeding is published together with the MG XIV proceedings.

Cosmic absorption of ultra high energy particles

Authors: Ruffini, R.; Vereshchagin, G. V.; Xue, S.-S.

Affiliation: AA(ICRANet; ICRA and Department of Physics, University of Rome "Sapienza"), AB(ICRANet; ICRA and Department of Physics, University of Rome "Sapienza"), AC(ICRANet; ICRA and Department of Physics, University of Rome "Sapienza")

Publication: Astrophysics and Space Science, Volume 361, article id.82, 11 pp. (Ap&SS Homepage)

On the interaction of high energy photons with the cosmic microwave background

MG14 Proceeding

Tizchang, Seddigheh; Batebi, Saghar; Mohammadi, Rohollah; Ruffini, Remo; Vereshchagin, Gregory;

S.-S. Xue

Abstract

We study the high energy photon interaction with cosmic microwave background (CMB) and calculate the optical depth due to Euler-Heisenberg photon-photon scattering at cos-mological redshift. According to our results the photon-photon scattering is predominant with respect to the Breit-Wheeler pair production at energies below 1 GeV. However, it is relevant for sources of high energy photons at high redshift z > 100. We also discuss implications of our results for two astrophysical observations of gamma-ray bursts and blazars.

The generation of circular polarization of GRB

MG14 Proceeding

Batebi, Saghar ; Tizchang, Seddigheh; Rohollah. Mohammadi, Remo. Ruffini, and S.-S. Xue

ABSTERACT

A certain degree of linear polarization has been measured in several GRB afterglows. Astonishingly, circular polarization has been recently measured in GRB121024A for the first time. In this paper by considering Gamma Ray Burst interactions to cosmic microwave background photons through Euler-Heisenberg effective Lagrangian, GRB circular polarization is discussed.

MG14 meeting

Pair creation in the early universe

Stahl Cl\'ement Strobel Eckhard and Xue She-Sheng

In the very early universe, a generalized Schwinger effect can create pairs from both electrical and gravitational fields. The expectation value of fermionic current induced by these newly created pairs has been recently computed in de Sitter spacetime. I will discuss different limiting cases of this result and some of its possible physical intepretations.

C. Stahl and E. Strobel, AIP Conf. Proc. **1693**, 050005 (2015) [arXiv:1507.01401 [hep-th]]. proceeding of the 2nd Cesare Lattes Meeting

Semiclassical fermion pair creation in de Sitter spacetime

Clément Stahl, Eckhard Strobel

(Submitted on 6 Jul 2015)

We present a method to semiclassically compute the pair creation rate of bosons and fermions in de Sitter spacetime. The results in the bosonic case agree with the ones in the literature. We find that for the constant electric field the fermionic and bosonic pair creation rate are the same. This analogy of bosons and fermions in the semiclassical limit is known from several flat spacetime examples.

Comments: 10 pages, no figure, proceeding of the 2nd Cesare Lattes Meeting

AIP Conf. Proc. 1693, 050005 (2015)

the third fermion family SS Xue, Physical Review D 93, 073001 (2016)

B-mode polarization of the CMB and the cosmic neutrino background
PHYSICAL REVIEW D93, 125029 (2016)

Rohoollah Mohammadi, Jafar Khodagholizadeh, M. Sadegh, and She-Sheng Xue

It is known that in contrast with the E-mode polarization the B-mode polarization of the cosmic microwave background cannot be generated by the Compton scattering in the case of the scalar mode of metric perturbation. However, it is possible to generate the B mode by the Compton scattering in the case of the tensor mode of metric perturbation. For this reason, the ratio of tensor to scalar modes of metric perturbation ($r \sim C_{B l}/C_{E l}$) is estimated by comparing the
B-mode power spectrum with the E mode at least for small ℓ. We study the cosmic microwave background polarization, especially the B-mode due to the weak interaction of the cosmic neutrino background and cosmic microwave background, in addition to the Compton scattering in both cases of scalar and tensor metric perturbations. It is shown that the power spectrum C_{Bl} of the B-mode polarization receives some contributions from scalar and tensor modes, which have effects on the value of the r- parameter. We also show that the B-mode polarization power spectrum can be used as an indirect probe into the cosmic neutrino background.
B-mode polarization receives some contributions from scalar and tensor modes, which have effects on the value of the r-parameter. We also show that the B-mode polarization power
spectrum can be used as an indirect probe into the cosmic neutrino background. For the details of this part, see Physics Review D 93, 091301 (2016), R. Mohammadi, J. Khodagholizadeh, M. Sadegh, and She-Sheng Xue.

Adjunct Professors of the Faculty

Aharonian Felix

Position: Adjunct Professor

Period covered: 2016

I Scientific Work

The research has been focused on the study of the origin of Galactic Cosmic Rays based on the interpretations of the recent observations of diffuse gamma-rays and neutrinos.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

SOC member of 9 international conferences and workshops in 2016

II b Work With Students

Supervised two PhD students from the Yerevan seat of ICRANet

II c Diploma thesis supervision

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II d Other Teaching Duties

A short course on High Energy Astrophysics (Florianopolis, March 2016) in the framework of ICRANet

III. Service activities

III a. Within ICRANet

Member of the Scientific Committee of ICRANet

III b. Outside ICRANet

Member of the Scientific Advisory Committee of Astroparticle Physics European Consortium

Chair of the Intern. Advisory Council of UCCUB Institute of Sciences of Cosmos, University of Barcelona, Spain

Member of the Science Advisory Committee of the High Energy Astrophysics Domain of Horizon 2020

IV. Other

Scientific Leader of two research groups in the Dublin Institute for Advanced Studies (Ireland)

and in the Max Planck Institute for Nuclear Physics, Heidelberg, Germany

2016 List of Publication

A. Prosekin, S. R. Kelner, and F. A. Aharonian, "Polarization of radiation of electrons in highly turbulent magnetic fields," Physical Review D, vol. 94, no. 6, 2016.

X. Sun, R.-z. Yang, B. Mckinley, and F. Aharonian, "Giant lobes of Centaurus A as seen in radio and gamma-ray images obtained with the Fermi-LAT and Planck satellites," Astronomy and Astrophysics, vol. 595, 2016.

L. Ambrogi, E. De Ona Wilhelmi, and F. Aharonian, "On the potential of atmospheric Cherenkov telescope arrays for resolving TeV gamma-ray sources in the Galactic plane," Astroparticle Physics, vol. 80, pp. 22–33, 2016.

R. Liu, A. M. Taylor, X.-Y. Wang, and F. A. Aharonian, "Indication of a local fog of subankle ultrahigh energy cosmic rays," Physical Review D, vol. 94, no. 4, 2016.

F. Voisin, G. Rowell, M. G. Burton, A. Walsh, Y. Fukui, and F. Aharonian, "ISM gas studies towards the TeV PWN HESS J1825-137 and northern region," Monthly Notices of the Royal Astronomical Society, vol. 458, no. 3, pp. 2813–2835, 2016.

R. Yang and F. A. Aharonian, "On the GeV excess in the di↵use gamma-ray emission towards the Galactic centre," Astrophysics & Astronomy, vol. 589, 2016.

R. Yang, F. Aharonian, and C. Evoli, "Radial distribution of the di↵use gamma-ray emissivity in the Galactic disk," Physical Review D, vol. 93, no. 12, 2016.

Amati Lorenzo

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

Period covered: full 2016

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 fo 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 2016 I contributed to finalizing several research works which were the subject of the PhD Thesis of IRAP-PhD students. For example, in collaboration with the University of Nice and ARTEMIS, we worked on the unusual behaviour of GRB 141221A, based on a unique collection of multi-wavelengths data. Also, in collaboration with University of Ferrara and University Federico II di Napoli, we concluded the investigation of spectrl-energy correlations in GRBs

and the reliability of their use for cosmology. 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

November 2016 IV Italian National Workshop on GRBs
Bergamo, Italy (invited session chair/rapporteur and oral presentation)

October 2016 Eighth Huntsville Gamma-Ray Burst Symposium
Huntsville AL, USA (invited oral presentation)

October 2016 11th Workshop on Science with the New generation of High Energy Gamma-ray Experiments (SCINEGHE16)
Pisa, Italy (oral presentation)

September 2016 SIGRAV 2016 XXII Conference - A Century of General Relativity
Cefalù, Italy (invited oral presentation)

September 2016 Astrophysical Probes of Fundamental Physics
Ferrara, Italy (lecturer)

July 2016 Signals from the Deep Past - Unveiling Early Cosmic Structures
Valletta, Malta (oral presentation)

July 2016 European Week of Astronomy and Space Science (EWASS 2016)
Athenis, Greece (oral presentation)

June 2016 SPIE Astronomical Telescopes + Instrumentation
Edinburgh, UK

II b Work With Students
In 2016 I mostly worked with Disha Sawant, student of the IRAP Erasmus Mundus PhD at University of Ferrara, concerning the investigation of the Ep,i – intensity correlations in GRBs and their use for cosmology

II c Diploma thesis supervision

I have been the supervisor of Disha Sawant, student of the IRAP Erasmus Mundus PhD at University of Ferrara, who successfully defended her Thesis on next February 29th. I am the supervisor of Chiara Giuri, student for the "Laurea Magistrale " (master) diploma in Astrophysics anc Cosmolgy at University of Bologna.

II d Other Teaching Duties

I am member of the faculty of the PhD course in Physics at University of Ferrara.

II e. Work With Postdocs

In 2016 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

III a. Within ICRANet

III b. Outside ICRANet

I am member of the Faculty of the PhD in Physics and Geophysical Sciences at Unievrsity of Ferrara. In September 2016 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).

2016 List of Publication

M. Demianski, E. Piedipalumbo, D. Sawant, **L. Amati**, 2016, " Cosmology with gamma-ray bursts. II. Cosmography issues and cosmological scenarios for the accelerated Universe " , Astronomy & Astrophysics, in press

M. Demianski, E. Piedipalumbo, D. Sawant, **L. Amati**, 2016, " Cosmology with gamma-ray bursts. I. The Hubble diagram through the calibrated Ep,i - Eiso correlation " , Astronomy & Astrophysics, in press

W., Yuan, **L. Amati,** J.K. Cannizzo, B. Cordier, N. Gehrels, G. Ghirlanda, D. Götz, N. Produit, Y. Qiu, J. Sun, N.R. Tanvir, J. Wei, C. Zhang, 2016, " Perspectives on Gamma-Ray Burst Physics and Cosmology with Next Generation Facilities " , Space Science Reviews, in press

L. Amati, D.S. Sawant, M. Della Valle, 2016, " GRB cosmology through the Ep,i - intensity correlation " , Astronomical and Astrophysical Transactions, 29/2, 193

B. P. Abbott, R. Abbott, T. D. Abbott, M. R. Abernathy, F. Acernese, ..., **L. Amati,** et al., 2016, " Supplement: Localization and broadband follow-up of the gravitational-wave transient GW150914 " , The Astrophysical Journal Supplement, 225, 8

B. P. Abbott, R. Abbott, T. D. Abbott, M. R. Abernathy, F. Acernese, ..., **L. Amati**, et al., 2016, " Localization and broadband follow-up of the gravitational-wave transient GW150914 " , The Astrophysical Journal Letters, 826, L13

C. Guidorzi, S. Dichiara, **L. Amati**, 2016, " Individual power density spectra of Swift gamma-ray bursts " , Astronomy & Astrophysics, 589, A98

S. Dichiara, C. Guidorzi, **L. Amati,** F. Frontera, R. Margutti, 2016, " A correlation between peak energy and Fourier power density spectrum slope in Gamma-Ray Bursts " , Astronomy & Astrophysics, 589, A97

O. Bardho, B. Gendre, A. Rossi, **L. Amati**, J. Haislip, A. Klotz, E. Palazzi, D. Reichart, A.S. Trotter, M. Boer, 2016, " GRB 141221A: gone as the wind " , Monthly Notices of the Royal Astronomical Society, 459, 508

F. Frontera, **L. Amati**, R. Farinelli, S. Dichiara, C. Guidorzi, R. Landi, L. Titarchuk, 2016, " Possible physical explanation of the intrinsic Ep,i-"intensity" correlation commonly used to "standardize" GRBs " , International Journal of Modern Physics D, 25, 1630014

E. Zaninoni, M.G. Bernardini, R. Margutti, **L. Amati**, 2016, " Update on the GRB universal scaling Ex,iso-Egamma,iso-Epk with ten years of Swift data. " , Monthly Notices of the Royal Astronomical Society, 455, 1375

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)

III Service activities

Scientific collaboration with:
Prof. R. Ruffini (University of Rome, Italy and ICRANet);

Prof. R.T. Jantzen (Villanova Univesity, 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*

2016 List of publications

1) Bini D., Esposito G. and Geralico A.,
Late time evolution of cosmological models with non-ideal fluids,
Phys. Rev. D, vol. 93, 023511 (2016).

2) 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, vol. 93, 064023 (2016)
[arXiv:1511.04533 [gr-qc]].

3) Bini D., Damour T. and Geralico A.,
New gravitational self-force analytical results for
eccentric orbits around a Schwarzschild black hole
Phys. Rev. D, 93, 104017 (2016)
[arXiv:1601.02988 [gr-qc]].

4) Punsly B., Bini D.
General Relativistic Considerations of the Field Shedding Model
of Fast Radio Bursts
Mon. Not. Roy. Astron. Soc. vol. 459, L41 (2016)
[arXiv:1603.05509 [astro-ph.HE]].

5) Bini D. and Geralico A.,
Scattering by a Schwarzschild black hole of particles undergoing drag force effects
General Relativity and Gravitation, vol. 48, 101 (2016)

6) Bini D. and Mashhoon B.
Nonlocal Gravity: Conformally Flat Spacetimes
J. Geom. Methods Mod. Phys. 13, 1650081 (2016)

[arXiv:1603.09477 [gr-qc]]

7) Bini D., Damour T. and Geralico A.,
High post-Newtonian order gravitational self-force analytical results for eccentric orbits around a Kerr black hole,
Phys. Rev. D, vol. 93, 124058 (2016)
[arXiv:1602.08282 [gr-qc]]

8) Bini D. and Geralico A.,
Schwarzschild black hole embedded in a dust field:
scattering of particles and drag force effects,
Class. Quantum. Grav., vol. 33, 125024 (2016)

9) Bini D. and Damour T.
Conservative second-order gravitational self-force on circular orbits
and the effective one-body formalism,
Phys. Rev. D, vol. 93, 104040 (2016)
[arXiv:1603.09175 [gr-qc]]

10) Bini D., Geralico A. and Jantzen R.T.,
Gyroscope precession along bound equatorial plane orbits around a Kerr black hole,
Phys. Rev. D vol. 94, 064066 (2016)
e-Print: arXiv:1607.08427

11) Bini D., Damour T. and Geralico A.,
High-order post-Newtonian contributions to gravitational self-force
effects in black hole spacetimes,
Proceedings of the international meeting " INdAM Workshop on Innovative Algorithms and Analysis"
May 17-20, 2016, Rome (It). Ed. by Springer.

12) Bini D., Mashhoon B.
Relativistic Gravity Gradiometry: The Mashhoon--Theiss Effect,
Submitted, e-Print: arXiv:1607.05473 [gr-qc]

13) Bini D., Carvalho G. and Geralico A.,
Scalar field self-force effects on a particle orbiting a Reissner-Nordstrom black hole
Submitted, e-Print: arXiv:1610.02235 [gr-qc].

14) Bini D., Geralico A. and Jantzen R. T.,
Gyroscope precession along unbound equatorial plane orbits around a Kerr black hole,
Submitted, e-Print: arXiv:1610.06513 [gr-qc].

Thomas Buchert

Position: Professor of Cosmology Staff Member of CRAL, Head of Cosmology Group: Université Lyon 1 and École Normale Supérieure Lyon, Adjunct Professor of the Faculty : ICRANet
Period covered: January 2016 - December 2016

I Scientific Work

(i) Investigation of (Lagrangian) perturbative models in relativistic cosmology including gravitational waves at first order. Investigation of gravitational entropies in relation to the Penrose conjecture.

(ii) Observational strategies to detect an inhomogeneous metric in the Baryonic Accoustic Oscillation peak. Observational bounds on the age of the Universe. Observational challenges of the standard FLRW model.

(iii) Model-independent analysis of non-Gaussianity in Planck CMB data using Minkowski Functionals.

(iv) Generalization of scalar averaging schemes for arbitrary 3+1 foliations of space-time and arbitrary fluid content. Investigation of new backreaction variables relevant at the CMB epoch.

II Conferences and educational activities

II a Conferences and Other External Scientific Work
- LOC and SOC : Workshop OPUS7 on "Numerical Methods in Inhomogeneous Cosmology", Torun, Poland (May 2016).
- Seminar at Max-Planck Institut for Physics, Munich (August 2016).
- LOC and SOC : Preparation of Workshop in Torun, Poland (July 2017).

II b Work With Students
2 PhD students: Jan. J. Ostrowski (defence 2016) ; Pierre Mourier (start September 2016).

II c Diploma thesis supervision:
1 Master student M2 (Pierre Mourier ; 1-year extended stage) ; 1 Master student M1 (Paul Godart).

II d Other Teaching Duties see below.

II e. Work With Postdocs :
Collaboration with Alexander Wiegand (CfA Harvard, U.S.A.). Collaboration with Jan J. Ostrowski who is a new Postdoc at CRAL, financed by the Excellence Cluster LIO (Lyon Institut of Origins).

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" (M2) and "Introduction to Theories of Gravitation" (M1), both at École Normale Supérieure, Lyon ; Exercises in "Geometry and Physics".

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

2016 List of Publications

peer-reviewed - in preparation

ad (i) - Buchert T., Al Roumi F., Wiegand A.: 'Lagrangian theory of structure formation in relativistic cosmology IV: Lagrangian approach to gravitational waves'. In preparation (2016).

ad (i) - Buchert T., Mourier P. Ostrowski J.J.: 'Lagrangian theory of structure formation in relativistic cosmology V: Gravitational entropies and the Penrose conjecture'. In preparation (2016).

ad (iv) - Buchert T., Mourier P., Roy X.: 'On average properties of inhomogeneous fluids in general relativity III: General fluid cosmologies in arbitrary 3+1 foliations'. In preparation (2016).

peer-reviewed - submitted

ad (ii) Roukema B.F., Mourier P., Buchert T., and Ostrowski J.J.: 'The background Friedmannian Hubble constant in relativistic inhomogeneous cosmology and the age of the Universe'. Astron. Astrophys., submitted (2016).

ad (iii) - Buchert T., France M.J., and Steiner F.: 'Model-independent analyses of non-Gaussianity in Planck CMB maps using Minkowski Functionals'. Class. Quant. Grav., submitted (2016). (Invited Article for Focus Issue 'Planck and fundamentals of cosmology')

peer-reviewed - published

ad (ii) - 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 456, L45-L48 (2016).

ad (ii) - Buchert T., Coley A.A., Kleinert H., Roukema B.F., and Wiltshire D.L.: 'Observational challenges for the standard FLRW model'. Int. J. of Mod. Phys. D 25, 1630007 (2016). (Invited review)

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 appear (2016) - Report on MGIV 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 appear (2016).

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 appear (2016).

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: 2016

I Scientific Work

We fitted data of several black hole binaries to obtain the mass of the black hole candidate and to get physical parameters such as accretion rates, size of the Compton cloud etc. We have studied vertical oscillation of an avdective flow on its way to a black hole. We also studied the time and phase lag between hard and soft photons emitted from Two component Advective Flows around black holes. We treat the Earth's atmosphere as a gigantic detector and computed the injected spectra from the Sun from the VLF data. I led the balloon borne astronomy team to have a total of 10 balloon missions (D90 to D99) in which good quality data was obtained and various payloads have been tested. Our low cost balloon experiment yielded anti-correlation between the cosmic ray intensity and the solar activity. In astrobiology/astrochemistry work we have studied abundances of Interstellar Carbon Chain molecules.

II Conferences and educational activities

II a Conferences and Other External Scientific Work:

Mar. 2016: "Gravitational Waves and Black Holes" at 'Togetherness for Better Tomorrow' Forum, Tollygaunj, Kolkata.

September, 2016: Gave a course on accretion processes in Black Holes at the University of cape Town, South Africa.

September, 2016: Gave public lectures on "Chemical Evolution of the Universe since Big Bang, and Origin of Life" at the University of Durban and the University of Cape Town.

September, 2016: Gave departmental seminars on "Food Habits of Black Holes" at the University of Durban and the University of Cape Town.

November, 2016: Assessed the performance of TIFR during last five years for it to remain deemed University as a part of NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC) of University Grants Commision.

II b Work With Students: In 2016 four students have submitted PhD Thesis. So far 34 PhD students have completed PhD work under my supervision and another 15 are at various stages of completion.

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 several 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

III a. Within ICRANet:

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

2016 List of Publications

(A) In refereed Journals

1. Jana, Arghajit; Debnath, Dipak; Chakrabarti, Sandip K.; Mondal, Santanu; Molla, Aslam Ali, Accretion Flow Dynamics of MAXI J1836-194 During Its 2011 Outburst from TCAF Solution, Astrophysical Journal, 2016, 819, 107

2. Chakraborty, Suman; Palit, Sourav; Ray, Suman; Chakrabarti, Sandip K., Modeling of the lower ionospheric response and VLF signal modulation during a total solar eclipse using ionospheric chemistry and LWPC, 2016, Astrophysics and Space Science, 2016, 361, 72

3. Das, Ankan; Sahu, Dipen; Majumdar, Liton; Chakrabarti, Sandip K., Deuterium enrichment of the interstellar grain mantle, Mon. Not. R. Astron. Soc., 2016, 455, 540.

4. Nagarkoti, Shreeram; Chakrabarti, Sandip K., Upper Limit of the Viscosity Parameter in Accretion Flows around a Black Hole with Shock Waves, 2016, Astrophysical Journal, 816, 7.

5. Nwankwo, Victor U. J.; Chakrabarti, Sandip K.; Ogunmodimu, Olugbenga, Probing geomagnetic storm-driven magnetosphere-ionosphere dynamics in D-region via propagation characteristics of very low frequency radio signals, Journal of Atmospheric and Solar-Terrestrial Physics, 2016, 145, 154.

6. Deb, A., Giri, K., Chakrabarti, S.K.: Numerical simulation of vertical oscillations in an axisymmetric thick accretion flow around a black hole, MNRAS, 2016, 462, 3502

7. Molla, Aslam Ali; Chakrabarti, Sandip K.; Debnath, Dipak; Mondal, Santanu, Estimation of Mass of Compact Object in H 1743-322 from 2010 and 2011 Outbursts using TCAF Solution and Spectral Index - QPO Frequency Correlation (In press)

8. Nagarkoti, Shreeram; Chakrabarti, Sandip K., Viscosity parameter in dissipative accretion flows with mass outflow around black holes, 2016, MNRAS, 462, 850

9. Etim, Emmanuel E.; Gorai, Prasanta; Das, Ankan; Chakrabarti, Sandip K.; Arunan, 2016, Elangannan, Systematic Theoretical Study on the Interstellar Carbon Chain Molecules (In press).

10. Dutta, Broja G.; Chakrabarti, Sandip K., Temporal Variability from the Two-Component Advective Flow Solution and Its Observational Evidence, 2016, ApJ, 828, 101

11. Ghosh, A.; Chakrabarti, Sandip K., Smearing of mass accretion rate variation by viscous processes in accretion disks in compact binary systems, 2016, ApSS, 361, 310

12. Mondal, Santanu; Chakrabarti, Sandip K.; Debnath, Dipak, Spectral study of GX 339-4 with TCAF using Swift and NuSTAR observation, 2016, ApSS, 361, 309

13. Molla, Aslam Ali; Debnath, Dipak; Chakrabarti, Sandip K.; Mondal, S.; Jana, A., Estimation of the mass of the black hole candidate MAXI J1659-152 using TCAF and POS models, 2016, MNRAS, 460, 3163

14. Chatterjee, Debjit; Debnath, Dipak; Chakrabarti, Sandip K.; Mondal, Santanu; Jana, Arghajit, Accretion Flow Properties of MAXI J1543-564 during 2011 Outburst from the TCAF Solution, 2016, 827, 88

15. Nwankwo, Victor U. J.; Chakrabarti, Sandip K.; Ogunmodimu, Olugbenga, Probing geomagnetic storm-driven magnetosphere-ionosphere dynamics in D-region via propagation characteristics of very low frequency radio signals, 2016, JASTP, 145, 154

16. Palit, S.; Ray, S.; Chakrabarti, S. K., Inverse problem in ionospheric science: prediction of solar soft-X-ray spectrum from very low frequency radiosonde results, 2016, ApSS, 361, 151

(B) BOOKS

None

Massimo Della Valle

Position: Director of Capodimonte Astronomical Observatory, INAF-Naples
Period covered: from 2010

I Scientific Work

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

Supernova and Gamma-ray Burst connection

Galactic and extragalactic Novae

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

III. Service activities:

Scientific Board (Italy)

2016 List of Publication

1. Highly enriched 7Be in the ejecta of Nova Sagittarii 2015 No. 2 (V5668 Sgr) and the Galactic 7Li origin, Molaro, P, Izzo, L, Mason, E. et al. 2016, MNRAS, 463, L117
2. Pan-STARRS and PESSTO search for an optical counterpart to the LIGO gravitational-wave source GW150914, Smartt, S., Chambres, K., Smith, K. et al. 2016, MNRAS, 462, 4094
3. Supernova rates from the SUDARE VST-Omegacam search II. Rates in a galaxy sample, Botticella, M.T., Cappellaro, E., Greggio, L. et al. 2016, A&A, in press, arXiv161001176B
4. On extreme transient events from rotating black holes and their gravitational wave emission, van Putten, M. & Della Valle, M. 2016, MNRAS, in press arXiv161000535V
5. A Search for an Optical Counterpart to the Gravitational-wave Event GW151226, Smartt, S., Chambres, K., Smith, K. et al. 2016, ApJ, 827, L40
6. The new SOXS instrument for the ESO NTT, Schipani, P. Claudi, R. Campana, S. et al. 2016, SPIE Astronomical Telescopes & Instrumentation 2016, paper 9908-152, 2016arXiv160703729S
7. Supplement: "Localization and Broadband Follow-up of the Gravitational-wave Transient GW150914" , Abbott, B., Abbott, R., Abbott, T. et al. 2016, ApJS, 225, 8

8. Localization and Broadband Follow-up of the Gravitational-wave Transient GW150914, Abbott, B., Abbott, R., Abbott, T. et al. 2016, ApJ, 826, L13

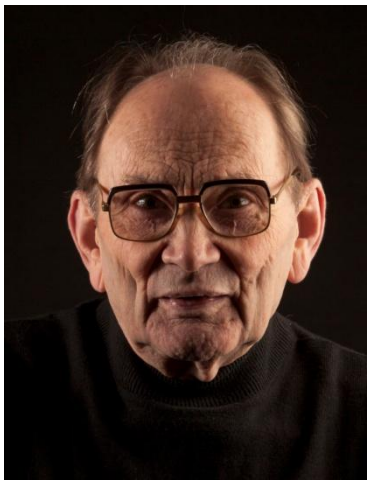
9. On the nature of Hydrogen-rich Superluminous Supernovae, Inserra, C., Smartt, S., Gall, E. et al. 2016, ApJ, submitted, 2016arXiv160401226I

10. A time domain experiment with Swift: monitoring of seven nearby galaxies, Andreoni, I, D'Avanzo, P., Campana, S. et al. 2016, A&A, 587, 147

11. Proposed searches for candidate sources of gravitational waves in a nearby core-collapse supernova survey, Heo, J., Yoon, S., Lee, D. et al. 2016, NewA, 42, 24

12. First Results from Supernova Diversity and Rate Evolution (SUDARE) Survey at VST, Botticella, M.T., Cappellaro, E., Pignata, G. et al. 2016, The Universe of Digital Sky Surveys, Astrophysics and Space Science Proceedings, Volume 42., Springer International Publishing Switzerland, 2016, p. 197

Einasto Jaan



Position: Adjunct Professor
Period covered: 2016

I Scientific Work

Einasto et al. (2016a) performed a study to understand how the lack of galaxy formation invoids influences geometrical properties of the cosmic web. We calculate the density field of theSDSS main sample of galaxies and of a LambdaCDMmodel, and use variable threshold density levels to divide the space into high- and low-density regions (clusters and voids). We define the clustered matter model as a sample of particles associated with galaxies, it includes only particles of density above the mean density. To characterise geometrical properties of the cosmic web we find the largest clusters and voids, and calculate their lengths, filling factors and numbers as functions of the threshold density. We call these statistics geometrical curves. Geometrical curves for clusters of dark matter models, clustered matter models and SDSS samples are similar. Geometrical curves for voids of dark matter models vs. clustered matter and SDSS samples are very different. SDSS and clustered matter model samples have only one large percolating void. Dark matter models have at small threshold densities numerous tiny voids, surrounded by percolating clusters. We conclude that the geometry of the cosmic web is complex, and geometrical curves of clusters and voids yield additional information of properties of the cosmic web. Geometrical curves for voids of SDSS and clustered matter models are very asymmetrical. The density field of the luminous matter is non-Gaussian by a large margin.

Signatures of the processes in the early Universe are imprinted in the cosmic web (Einastoet al., 2016b). Some of them may define shell-like structures characterised by typical scales.Examples of such structures are shell-like systems of galaxies, which are interpreted as a signaturesof the baryon acoustic oscillations. Our results confirm that shell-like structures can be found in the distribution of nearby galaxies and their systems. The radii of the possible shells are larger than expected for a baryonic acoustic oscillations (BAO) shell (≈ 109 h^−1 Mpc versus ≈ 120−130 h^−1 Mpc), and they are determined by very rich galaxy clusters and superclusters. In contrast, BAO shells are barely seen in the galaxy distribution. We discuss consequences of these differences.

We invstigated the cosmic web, where galaxy superclusters or their high-density cores are the largest objects that may collapse at present or during the future evolution (Einasto et al., 2016c). We studied the dynamical state and possible future evolution of galaxy superclusters from the Sloan Great Wall (SGW), the richest galaxy system in the nearby Universe. We calculated supercluster masses using dynamical masses of galaxy groups and stellar masses of galaxies. We employed normal mixture modelling to study the structure of rich SGW superclusters and search for components (cores) in superclusters. We analysed the radial mass distribution in the high-density cores of superclusters centred approximately at rich clusters and used the spherical collapse model to study their dynamical state. We found that the lower limit of the total mass of the SGW is approximately M = 2.5 × 10^16

h^−1M⊙. Different mass estimators of superclusters agree well, the main uncertainties in masses of superclusters come from missing groups and clusters. We detected three high-density cores in the richest SGW supercluster (SCl 027) and two in the second richest supercluster (SCl 019). They have masses of 1.2 − 5.9 × 10^15 h^−1M⊙ and sizes of up to ≈ 60 h^−1 Mpc. High-density cores of superclusters are very elongated, flattened perpendicularly to the line of sight. The comparison of the radial mass distribution in the high-density cores with the predictions of spherical collapse model suggests that their central regions with radii smaller than 8 h^−1Mpc and masses of up to M = 2× 10^15 h^−1M⊙ may be collapsing. SGW superclusters with their high-density cores represent dynamically evolving environments for studies of the properties of galaxies and galaxy systems.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

June 20, Moscow, Russia, Conference "All-wave astronomy. Shklovsky-100"; talk "Evolution of Superclustersand Dark Energy";

September 20, Erevan, Armenia, "Conference dedicated to 70th anniversary of Byurakan Observatory", talk "Evolution of the Cosmic Web" (read by T. Viik).

III. Service activities

IV. Other

2016 List of Publication

Einasto, J. 2016a, Yakov Zeldovich and the Cosmic Web Paradigm, in IAU Symposium, Vol.308, The Zeldovich Universe: Genesis and Growth of the Cosmic Web, ed. R. van de Weygaert,S. Shandarin, E. Saar, & J. Einasto, 13

Einasto, J., Suhhonenko, I., Liivamägi, L. J., Einasto, M., & Tempel, E. 2016a, Galaxy formation and properties of the cosmic web, A&A, (submitted)

Einasto, M., Heinämäki, P., Liivamägi, L. J., Mart´ınez, V. J., Hurtado-Gil, L., Arnalte-Mur, P.,Nurmi, P., Einasto, J., & Saar, E. 2016b, Shell-like structures in our cosmic neighbourhood,A&A, 587, A116

Einasto, M., Lietzen, H., Gramann, M., Tempel, E., Saar, E., Liivamägi, L. J., Heinämäki,P., Nurmi, P., & Einasto, J. 2016c, Sloan Great Wall as a complex of superclusters withcollapsing cores, ArXiv 1608.04988

November 05, 2016

Filippo Frontera

Position: Contract Professor University of Ferrara and Associated scientist INAF-IASF Bologna
Period covered: Jan- November 2016

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 satellite 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 talk, Lamezia Terme (Calabria), 16 April 2016
b. Invited talk at a Medical conference in Crotone, 13-16 October 2016
c. Invited talk at the Conference of Italian Astronomical Society (SAIT), Rome, 3 May 2016
d. Invited talk at the Twenty Year Anniversary of the BeppoSAX launch, ASI Rome, 2 May 2016
e. Invited Talks at the HXMT workshop on high energy astrophysics, Beijing (China), 12-15 July 2016

II b. Work With Students

yes, with

a) 2 PhD students (Disha Sawant and Tais Maiolino), EMJD-IRAP-PhD program

II c Other Teaching Duties

A Master 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

2016 List of Publications

- Virgilli, E.; Frontera, F.; Rosati, P.; Bonnini, E.; Buffagni, E.; Ferrari, C.; Stephen, J. B.; Caroli, E.; Auricchio, N.; Basili, A.; Silvestri, S., *Focusing effect of bent GaAs crystals for γ-ray Laue lenses: Monte Carlo and experimental results,* Experimental Astronomy, Volume 41, Issue 1-2, pp. 307-326 (2016)

- Frontera, Filippo; Amati, Lorenzo; Farinelli, Ruben; Dichiara, Simone; Guidorzi, Cristiano; Landi, Raffaella; Titarchuk, Lev, *Possible physical explanation of the intrinsic Ep,i-"intensity" correlation commonly used to "standardize" GRBs*, International Journal of Modern Physics D, Volume 25, Issue 5, id. 1630014 (2016)

- Dichiara, S.; Guidorzi, C.; Amati, L.; Frontera, F.; Margutti, R., *VizieR Online Data Catalog: GRBs Ep and Fourier PDS slope correlation (Dichiara+, 2016),* VizieR On-line Data Catalog: J/A+A/589/A97. Originally published in: 2016A&A...589A..97D

- Dichiara, S.; Guidorzi, C.; Amati, L.; Frontera, F.; Margutti, R., *Correlation between peak energy and Fourier power density spectrum slope in gamma-ray bursts*, Astronomy & Astrophysics, Volume 589, id.A97, 10 pp (2016)

- Ukwatta, T. N.; Hurley, K.; MacGibbon, J. H.; Svinkin, D. S.; Aptekar, R. L.; Golenetskii, S. V.; Frederiks, D. D.; Pal'shin, V. D.; Goldsten, J.; Boynton, W.; Frontera, F.; and 14 coauthors, *Investigation of Primordial Black Hole Bursts Using Interplanetary Network Gamma-ray Bursts*, The Astrophysical Journal, Volume 826, Issue 1, article id. 98, 14 pp. (2016).

Chris Fryer

Position: Scientist 5 (Los Alamos National Laboratory),
adjunct faculty (University of Arizona)
adjunct faculty (University of New Mexico

Period covered: 01/2016-10/2016

I Scientific Work

Chris Fryer has worked on a broad range of astrophysics, focusing on astrophysical transients: their progenitors, their engines and their emission. He was part of the team that identified the importance of convection above the proto-neutron star for the core-collapse supernova engine and led the development of the first code studying this convection in 3-dimensions. He led the effort connecting compact mergers to short-duration gamma-ray bursts, producing one of the first simulations predicting the off-sets of these bursts. This work was recently confirmed through gamma-ray burst observations. He formed the LANL team modeling the emission from astrophysical transients focusing on mergers and supernovae. At LANL, he is the PI of the high energy/density physics impact program using laboratory experiments to study turbulence, radiation flow and opacities. He also works within the ASC next generation code team at LANL.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

Janie de la Rosa (UT San Antonio), Angela Collier (Univ. Kentucky), Harrison Bachrach (UC Berkeley), Sydney Andrews (NM Tech), Cole Kendrick (NM Tech)

II c Diploma thesis supervision

Janie de la Rosa (defending in 2017)

II d Other Teaching Duties

II e. Work With Postdocs

Primary Mentor: Carola Ellinger (LANL) – Studying Supernova Ejecta, Sam Jones (LANL) – Studying Stellar Mixing

III. Service activities

III a. Within ICRANet: SOC (Supernovae, Hypernovae and Binary-Driven Hypernovae, an Adriatic Workshop)

III b. Outside ICRANet: SOC (COSPAR session, meeting was cancelled at last minute in Turkey)

PI: High Energy Density Physics Impact Program (LANL)

Director: Center for Theoretical Astrophysics (LANL)

IV. Other

2016 List of Publication (24 total from 01/16-10/16, 14 refereed – refereed only listed)

1) Johns, H.~M., Lanier, N.~E., Kline, J.~L., et al. 2016, Review of Scientific Instruments, 87, 11E337

2) Belczynski, K., Heger, A., Gladysz, W., et al. 2016, aap, 594, A97

3) Lloyd-Ronning, N.~M., Dolence, J.~C., & Fryer, C.~L. 2016, MNRAS, 461, 1045

4) Pignatari, M., Herwig, F., Hirschi, R., et al. 2016, APJS, 225, 24

5) Abbott, B.~P., Abbott, R., Abbott, T.~D., et al. 2016, APJS, 225, 8

6) Abbott, B.~P., Abbott, R., Abbott, T.~D., et al. 2016, APJL, 826, L13

7) Cote, B., Ritter, C., O'Shea, B.~W., et al. 2016, APJ, 824, 82

8) Annis, J., Soares-Santos, M., Berger, E., et al. 2016, APJL, 823, L34

9) Soares-Santos, M., Kessler, R., Berger, E., et al. 2016, APJL, 823, L33

10) Harding, J.~P., Fryer, C.~L., & Mendel, S. 2016, APJ, 822, 102

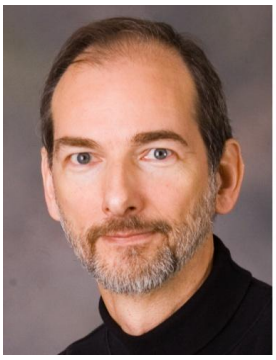
11) Fryer, C.~L., Dodd, E., Even, W., et al. 2016, High Energy Density Physics, 18, 45

12) de la Rosa, J., Roming, P., Pritchard, T., & Fryer, C. 2016, APJ, 820, 74

13) Belczynski, K., Repetto, S., Holz, D.~E., et al. 2016, APJ, 819, 108

14) Jones, S., Ritter, C., Herwig, F., et al. 2016, MNRAS, 455, 3848

Jantzen Robert



Position: Professor
Period covered: Summer 2015 through Fall 2016

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

III a. Within ICRANet

Continuing MG14 editorial duties, MG14 organizational work

III b. Outside ICRANet

IV. Other

Summer 2015 through Fall 2016 List of Publications

Gyroscope precession along bound equatorial plane orbits around a Kerr black hole
D. Bini, A. Geralico and R.T. Jantzen
Phys. Rev. D. 94, 064066 (2016).

Gyroscope precession along unbound equatorial plane orbits around a Kerr black hole
D. Bini, A. Geralico, and R.T. Jantzen
submitted to Physical Review (2016)

Jetzer Philippe

Position: Professor University of Zurich (Switzerland)
Period covered: 1.1.2016 – 31.10.2016

I Scientific Work

Main scientific activity on the topic of gravitational waves: both from the theoretical side and as a member of the LISA-Pathfinder science team and of the board of the LISA consortium. LISA-Pathfinder was successfully launched on 3 December 2015. Since then it performed extremely well and a first paper with the main results has already been published.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Organization of the XI LISA Symposium from 5 to 9 September 2016 at the University of Zurich.

II b Work With Students

Supervision of 4 PhD students

II c Diploma thesis supervision.

none

II d Other Teaching Duties

Regular teaching at the University of Zurich (Thermodynamics and General Relativity)

II e. Work With Postdocs

Regular scientific activity with the post-doc in my group.

III. Service activities

III a. Within ICRANet

Unfortunately none in the considered period.

III b. Outside ICRANet

see above.

IV. Other

2016 List of Publication

Gravitational wave polarization modes in f[R] theories, R.Kausar, L. Philippoz and P. Jetzer , Phys. Rev. D93, 124071 (2016).

Sub-femto-g free-fall for space-based gravitational observatories: LISA Pathfinder results, M. Armano et al. (The LISA Pathfinder collaboration), Phys. Rev. Lett. 116, 231101 (2016).

The Triangulum galaxy seen by Planck, F. De Paolis et al. , Astron. & Astrophys. 593, A57 (2016).

Lee Hyung Won

Position:
Period covered:

I Scientific Work

Modified Relativistic Dynamics with Prof. R. Ruffini and Prof. A. Qadir (work done mainly during ICRANet Pescara visit)

The effect of eccentric waveform for parameter estimation with student Jeongcho Kim and Dr. Chunglee Kim

Code development for parameter estimation with new gravitational waveforms with student Jeongcho Kim

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

III a. Within ICRANet

III b. Outside ICRANet

Participation to 5th Italiani-Pakistani workshop on relativistic astrophysics, 21~23 July 2016, Lecce

Participation to LVC collaboration meeting 29 Aug. ~ 2 Oct. 2016, Glasgow

Lectures at Inje University: C Programming, Motion Simulation, Cosmology(Graduate), Theoretical Physics(Graduate)

iKAGRA shift participation: 25 Mar. ~ 29 Mar. 2016, 15 Apr. ~ 19 Apr. 2016

IV. Other

2016 List of Publication

1. Sang Hoon Oh, Edwin Jaeju Son, Whansun Kim, John Jungkeun Oh, Hyung Won Lee, Jeongcho Kim, Young-Min Kim, "Observation and Data Analysis of the Gravitational Wave GW150914", New Physics: Sae Mulli, **66**, 283(2016).
2. Chunglee Kim, Hee Suk Cho, Gungwon Kang,, Hyung Won Lee, Chang-Hwan Lee, Hyun Kyu Lee, "Gravitational-wave Astronomy and Astrophysics", New Physics: Sae Mulli, **66**, 293(2016).

Quevedo Hernando

Position: Full Professor - National Autonomous University of Mexico -
Period covered: 2016

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

- Conference: "Relativistic Geodesy: Foundations and Applications", talk: "Determination of the metric from the curvature" Bad Honnef, Germany (March 12 - 19, 2016)
- Seminar: "The postulate of Einstein - Geometry = Physics - one hundred years later", Physics Institute – BUAP, Puebla, MEXICO (May 19, 2016)
- VI Summer School in Mathematics, plenary talk: "Fundaments of geometrothermodynamics", UNAM – Juriquilla, MEXICO (June 12 – 13, 2016)
- V Academic Sessions of Basic Sciences, plenary talk: "Geometry and Thermodynamic" CIIDET, Querétaro, MEXICO (August 18 – 20, 2016)
- Conference "Phenomenology of Strong Gravity", talk: "Geometrothermodynamics of black holes" Nazarbayev University, Astana, Kazajistán (September 17 – 19, 2016)
- Research stay at the Al Farabi Kazakh National University (Almaty, Kazakhstan, (August 30 – September 24, 2016)
- Conference: "Classical and Quantum Gravity Workshop", talk: "Geometrothermodynamics of black holes", Cartagena de Indias, Colombia (September 27 - October 1, 2016).
- Visit: New Granada Military University, Bogotá, Colombia (October 2 – 11, 2016).
- Visit: National University of Colombia, talks: "Black holes geometrothermodynamics", "The future GPS: Determination of the metric from the curvature" (October 6 – 7, 2016)

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
- Pedro Sánchez (PhD)
  Topic: Geometrothermodynamics in relativistic astrophysics
- Juan José Vega (PhD)

Topic: Topological quantization of mechanical systems
- Raúl Meléndez (MSc)
Topic: Relativistic geometrothermodynamics
- Andrés Solís (MSc)
Topic: Matching conditions in general relativity

II d Other Teaching Duties

II e. Work With Postdocs
- Christine Gruber, UNAM
- Francisco L. Escamilla, UNAM
- Alessandro Bravetti, UNAM

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

Course: Relativistic geometrothermodynamics – UNAM
Course: Relativistic astrophysics of neutron stars – Al Farabi Kazakh National University

IV. Other

2016 List of Publication

GEODESICS IN THE FIELD OF A ROTATING DEFORMED GRAVITATIONAL SOURCE
K. A. Boshkayev, H. Quevedo, M. S. Abutalip, Zh. A. Kalymova, Sh. S. Suleymanova
INTERNATIONAL JOURNAL OF MODERN PHYSICS A Particles and Fields; Gravitation; Cosmology 31, Issue 02 and 03, 1641006
DOI: 10.1142/S0217751X16410062

MOTION OF TEST PARTICLES IN THE FIELD OF A NAKED SINGULARITY
K. Boshkayev, E. Gasperín, A. C. Gutiérrez-Piñeres, H. Quevedo, and S. Toktarbay
PHYSICAL REVIEW D 93, No. 2 024024
DOI: 10.1103/PhysRevD.93.024024

GEOMETROTHERMODYNAMICS OF PHANTOM ADS BLACK HOLES
Quevedo, Hernando; Quevedo, Maria N.; Sanchez, Alberto
EUROPEAN PHYSICAL JOURNAL C 76, 3 Article Number: 110
DOI 10.1140/epjc/s10052-016-3949-4

CARDY-VERLINDE ENTROPY IN HORAVA-LIFSHITZ GRAVITY
Luongo, Orlando; Pisani, Giovanni Battista; Quevedo, Hernando
PHYSICAL REVIEW D 93, 6 Article Number: 064057
DOI: 10.1103/PhysRevD.93.064057

TEST PARTICLES IN A MAGNETIZED CONFORMASTATIC SPACETIME
Gutierrez-Pineres, Antonio C.; Capistrano, Abraao J. S.; Quevedo, Hernando

PHYSICAL REVIEW D 93, 12 Article Number: 124009
DOI: 10.1103/PhysRevD.93.124009

EINSTEIN-MAXWELL-DILATON PHANTOM BLACK HOLES: THERMODYNAMICS AND GEOMETROTHERMODYNAMICS

Quevedo, Hernando; Quevedo, Maria N.; Sanchez, Alberto
PHYSICAL REVIEW D 94, 2 Article Number: 024057
DOI: 10.1103/PhysRevD.94.024057

INCOME DISTRIBUTION IN THE COLOMBIAN ECONOMY FROM AN ECONOPHYSICS PERSPECTIVE

H. Quevedo and M.N. Quevedo
CUADERNOS DE ECONOMIA 35 (69) 691-707

I-LOVE-Q RELATIONS FOR WHITE DWARF STARS

K. Boshkayev, H. Quevedo and B. Zhami
MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY
DOI: 10.1093/mnras/stw2614

NEWMAN–JANIS ANSATZ IN CONFORMASTATIC SPACETIMES

Antonio C. Gutiérrez-Piñeres, Hernando Quevedo
GENERAL RELATIVITY AND GRAVITATION 48:146
DOI 10.1007/s10714-016-2144-0

A GEOMETROTHERMODYNAMIC APPROACH TO IDEAL QUANTUM GASES AND BOSE-EINSTEIN CONDENSATES

Hernando Quevedo, Sasha A. Zaldivar
e-Print: arXiv:1512.08755 Submitted: PHYSICAL REVIEW E

STOCHASTIC EINSTEIN EQUATIONS WITH FLUCTUATING VOLUME

Vladimir Dzhunushaliev , Hernando Quevedo
e-Print: arXiv:1603.00951Submitted: GRAVITATION AND COSMOLOGY

MULTIPOLE STRUCTURE OF COMPACT OBJECTS

Hernando Quevedo
e-Print: arXiv:1606.05985
Accepted in Proceedings of the conference "Nuclear Physics and Astrophysics" (Almaty, KZ, 2016)

GEOMETRIC APPROACHES TO THE THERMODYNAMICS OF BLACK HOLES

Christine Gruber, Orlando Luongo, Hernando Quevedo
Accepted in Proceedings of the Fourteenth Marcel Grossman Meeting on General Relativity edited by Massimo Bianchi, Robert T Jantzen, Remo Ruffini

QUADRUPOLAR METRICS

Hernando Quevedo

e-Print: arXiv:1606.09361
Accepted in "Neutron Star: Physics, Properties and Dynamics" editors N. Takibayev and K. Boshkayev

HARTLE FORMALISM FOR ROTATING NEWTONIAN CONFIGURATIONS
Kuantay Boshkayev, Hernando Quevedo, Zhanerke Kalymova and Bakytzhan Zhami
European Journal of Physics, 37 (2016) 065602.

SELF-ACCELERATED UNIVERSE INDUCED BY REPULSIVE EFECTS AS AN ALTERNATIVE TO DARK ENERGY AND MODIFED GRAVITIES
Orlando Luongo and Hernando Quevedo
e-Print: arXiv:1507.06446
Submitted to: Foundations of Physics

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

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.

2016 List of Publications

1. Aksenov, A. G.; Chechetkin, V. M. "Neutronization of matter in a stellar core and convection during gravitational collapse", Astron. Rep., 2016, v. 60, pp. 655—668

Alekseev George A.

Position: Leading researcher, Steklov Mathematical Institute

of the Russian Academy of Sciences Moscow, Russia

Period covered: 1975 – present time

I Scientific Work

Development of the theory of integrable reductions of Einstein's field equations and its applications in General Relativity and other gravity, string gravity and supergravity models in four and higher dimensions. Construction of physically interesting solutions for stationary axisymmetric fields, interacting gravitational and electromagnetic waves or cosmological models and studies of their physical and geometrical properties.

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

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2016 List of Publication

"Collision of strong gravitational and electromagnetic

waves in the expanding universe"

G. A. Alekseev

Phys. Rev. D 93, 061501(R) (2016) – Published 3 March 2016

Abstract

An exact analytical model of the process of collision and nonlinear interaction of gravitational and/or electromagnetic soliton waves and strong nonsoliton electromagnetic traveling waves of arbitrary profile propagating in the expanding universe (the symmetric Kasner spacetime) is presented. In contrast to intuitive expectations that rather strong traveling waves can destroy the soliton, it occurs that the soliton survives during its interaction with electromagnetic waves of arbitrary amplitude and profile, but its parameters begin to evolve under the influence of this interaction. If a traveling electromagnetic wave possesses a finite duration, the soliton parameters after interaction take constant values again, but these values in general are different from those before the interaction. Based on exact solutions of the Einstein-Maxwell equations, our model demonstrates a series of nonlinear phenomena, such as (a) creation of gravitational waves in the collision of two electromagnetic waves, (b) creation of electromagnetic soliton waves in the collision of a gravitational soliton with traveling electromagnetic waves, (c) scattering of a part of a soliton wave in the direction of propagation of a traveling electromagnetic wave, and (d) quasiperiodic oscillating character of fields in the wave interaction region and multiple mutual transformations of gravitational and electromagnetic waves in this region. The figures illustrate these features of nonlinear wave interactions in general relativity.

Cherubini Christian

Position: **Associate Professor** in Mathematical Physics (MAT/07). Integrated Center for Research (C.I.R.) Engineering Departmental Faculty, University "Campus Bio-Medico", Via A. del Portillo 21, I-001285 Rome, Italy.

Period covered: November 1st 2016-today

I Scientific Work

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

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

At the moment Prof Cherubini, together with Prof. S. Filippi, is working with the ICRANet PhD students Rahim Moradi and Wang Yu on problems of black hole magnetohydrodynamics around Kerr black holes. Moreover they are working with Dr Federico Cipolletta, a former IRAP PhD student, on numerical methods for rotating and self-gravitating classical fluid equilibrium configurations.

II c Diploma thesis supervision

II d Other Teaching Duties

-Lecturer "Mechanics and Thermodynamics" (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).

-Lecturer "Electromagnetism" (Engineering Departmental Faculty, University Campus Bio-Medico of Rome).

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

II e. Work With Postdocs

III. Service activities

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

Prof. 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 and Dr. J Rueda, he is involved in research activities in the fields of Stellar and Galactic Structures, Effective Geometries and Complex Systems in Nature.

2016 List of Publications

- Cherubini C. and Filippi S., Commun. Comput. Phys. 19, (2016), 758-769.
- Nestola, M.G.C., Gizzi, A., Cherubini, C., Filippi, S., International Journal of Modern Physics C 27 (2) (2016), 1650017.
- Ruffini R., Muccino M., Aimuratov Y., Bianco C.L. , Cherubini C., Enderli M., Kovacevic M., Moradi R., Penacchioni A.V., Pisani G. B., Rueda J.A., and Wang Y., The Astrophysical Journal, vol 831 (2), (2016) 178.

Wiltshire, David L.

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

Period at ICRANet: 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:

- *Shape Dynamics Workshop, Nijmegen, Netherlands, 2-3 April, 2016*
- *Crafoord Prize Symposium in Astronomy: Rotating black holes and their astrophysical consequences, Stockholm, Sweden, 25 May 2016*
- *GR21: 21st International Conference on General Relativity and Gravitation, New York, USA, 10-15 July, 2016*
- *CosPA2016: 13th International Symposium on Cosmology and Particle Astrophysics, Sydney, Australia, 28 November – 2 December*

II b Student supervision: Supervised 3 PhD students – *Nezihe Uzun (completed 2016), Yongzhuang Li, Asta Heinesen* – and 1 MSc students: *Lawrence Dam (completed 2016).*

II d Other Teaching Duties – Gave two lecture courses at University of Canterbury: *PHYS203 Quantum Physics; PHYS415 General Relativity.*

III. Service activities *III b. Outside ICRANet:* CosPA2016 Scientific Organizing Committee; Editorial Board of *Classical and Quantum Gravity*; Academic Board at the University of Canterbury, Council of NZ Institute of Physics, Newly appointed IUPAP representative to International society on General Relativity and Gravitation.

IV. Other activities Sabbatical March-July 2016. Presented seminars at *Niels Bohr Insitute, University of Copenhagen,* 19/4/2016*; University of Helsinki,* 11/5/2016*; Université de Lyon 1, France*, 20/5/2016; *University of Portsmouth,* 9/6/2016*; University of Bristol* 15/6/2016*; Imperial College, London,* 17/6/2016*; University of Sussex,* 28/6/2016*; University of Bonn,* 5/7/2016*; University of Nottingham,* 8/7/2016.

2016 List of Publications

- T. Buchert, A.A. Coley, H. Kleinert, B.F. Roukema, and D.L. Wiltshire, *"Observational challenges for the standard FLRW ",* Int. J. Mod. Phys. D **25** (2016) 1630007 [17pp]
- J.H. McKay and D.L. Wiltshire, *"Defining the frame of minimum nonlinear Hubble expansion variation",* Mon. Not. R. Astron. Soc. **457** (2016) 3285-3305; **463** (2016) 3113.
- K. Bolejko, M.A. Nazer and D.L. Wiltshire, *"Differential cosmic expansion and the Hubble flow anisotropy",* Classical and Quantum Gravity, JCAP **06** (2016) 035. [32 pp]

Research Scientists

Argüelles Carlos Raúl

Position: Assistant Professor - Researcher

Period covered: 2015

I Scientific Work

Research in theoretical and phenomenological aspects of particle Dark Matter, General Relativity, Horava gravity, compact objects, Black Hole Physics, galactic dynamics, Cosmology, Physics beyond standard model.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Invited talk at Supernovae, Hypernovae and Binary driven Hypernovae – An adriatic Workshop, Pescara, Italy, June 20 –30 2016

Invited talk at the Gravitational Waves, Cosmology and Compact Objects workshop, La Plata, Argentina, March 8 –9 2016

Invited talk at the First Sandoval Vallarta Caribbean Meeting:International conference on Gravitation and Cosmology, Mexico city, Mexico, Nov. 30 - Dec. 3 2015.

Invited talks at the XIV Marcel Grossmann Meeting, Rome, Italy, July 12-18 2015.

Invited talk at the 2nd C´esar Lattes Meeting:Supernova, Neutron Stars and Black Holes, Rio de Janeiro, Brasil, April 13-18 2015. Published by AIP Conference Proceedings 1693, 060002 2015

Invited talk at the 61 Encuentro de la red STRINGS@AR, Buenos Aires, Argentina, December 16 2014

Invited talk at the Zeldovich-100 Meeting:Subatomic particles, Nucleons, Atoms, Universe: processes and structure, Minsk, Belarus, March 10-14 2014.

Invited talk and poster at the 3rd Galileo-Xu Guangqi Meeting: The sun, the stars, the Universe and General Relativity, Beijing, China, October 11-15 2011. arXiv:1401.7132 [astro-ph.CO], IJMPCS 23, 357 (2013).

Invited talk at IRAP Ph.D. Erasmus Mundus School, Nice, France, September 2-20 2013.

Invited talk at the XXVI Texas Symposium on Relativistic Astrophysics, Sao Paulo, Brazil, December 15-20 2012.

Invited talk at the XIII Marcel Grossmann Meeting: on recent developments in theoretical and experimental General Relativity, Astrophysics and Relativistic field theories, Stockholm, Sweden, July 1-7 2012.

II b Work With Students

Master in Science Thesis supervisor.

Graduate Student: Manuel Díaz - University of Buenos Aires (UBA). Issue: Dark Matter and structure formation

II c Diploma thesis supervision

Ph.D. advisor

Ph.D. Student: Andreas Krut. Thesis: Dark matter and galactic structures. Institution: ICRANet-Erasmus Mundus Joint Doctorate (fifth cicle) Pheriod covered: (2014-). Director: Prof. Dr. R. Ruffini

II d Other Teaching Duties

Assistant Professor position in Quantum field theory at La Plata National University (Exact Sciences Faculty)

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

Scientific collaborator (ICRANet staff); Ph.D advisor; Meeting conferences.

III b. Outside ICRANet

Researcher position at CONICET – Argentina. Working place: FCAGLP - UNLP, La Plata, Argentina. Paseo del Bosque, Casco Urbano, B1900FWA La Plata, Buenos Aires. Phone: +54 0221 4236593 Int. 1052. Teaching activities as Assistant Professor at UNLP.

IV. Other

2016 List of Publication

[1] C. R. Argüelles, J. A. Rueda, and R. Ruffini, "Theoretical evidence of 50 keV fermionic dark matter from galactic observables," MNRAS, submitted (2016), arXiv: 1606.07040

[2] C. R. Argüelles, N. E. Mavromatos, J. A. Rueda, and R. Ruffini, "The role of self-interacting right-handed neutrinos in galactic structure," JCAP, Vol. 4, p. 038 (2016), arXiv: 1502.00136

[3] L. G. Gómez, C. R. Argüelles, V. Perlick, J. A. Rueda, and R. Ruffini, "Strong lensing by fermionic dark matter in galaxies", PRD, submitted (2016), arXiv: 1610.03442

Boshkayev Kuantay

Position: Associate Professor
Period covered: June 13-August 26, 2016

I Scientific Work

- Physics of Compact Objects: White Dwarfs and Neutron Stars,
- Exact and Approximate Solutions
- Quasiperiodic Oscillations

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- Adriatic Workshop entitled "Supernovae, Hypernovae and Binary Driven Hypernovae" held at ICRANet (http://www.icranet.org/am/) and given an invited talk on "I-Love-Q relations for White Dwarf Stars" (http://www.icranet.org/am/img/program.pdf);
- PhD thesis defense ceremony of Cristina Barbarino entitled "The fickle death of massive stars: from Hydrogen rich to Helium poor supernova explosion", July 18, 2016, Rome, Italy;
- seminar given by professor Sang Pyo Kim on the title "Pair Production from Charged Black Holes" at the ICRANet, July 20, 2016;

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

III b. Outside ICRANet: Teaching activities at al-Farabi Kazakh National University, Almaty, Kazakhstan

IV. Other

2016 List of Publication

1. Boshkayev K., Gasperín E., Gutiérrez-Piñeres A.C., Quevedo H., Toktarbay S. Physical Review D, Volume 93, Issue 2, id.024024 (2016).
2. Boshkayev K., Quevedo H., Abutalip M., Kalymova Zh., Suleymanova Sh. International Journal of Modern Physics A, Volume 31, Issue 2n03, id. 1641006 (2016).
3. Boshkayev K., Rueda J.A., Zhami B.A., Kalymova Zh., Balgymbekov G. International Journal of Modern Physics: Conference Series, Volume 41, id. 1660129 (2016).

4. Boshkayev K., Rueda J.A., Zhami B. Gravitation, Astrophysics, and Cosmology - Proceedings of the Twelfth Asia-Pacific International Conference. Edited by Hsu Jong-ping et al. Published by World Scientific Publishing Co. Pte. Ltd., 2016. ISBN #9789814759816, pp. 189-190.

5. Boshkayev K., Quevedo H., Kalymova Zh., Zhami B. European Journal of Physics, Volume 37, Issue 6, pp. 065602 (2016).

Siutsou Ivan

Position: visiting scientist

Period covered: June—July 2016

I Scientific Work

In collaboration with G. Vereshchagin we cover the topic of description of three-particles elementary processes in electron-positron plasma by Boltzmann equations, as well as emission from relativistic outflows, and in collaboration with R. Belvedere we study neutron stars in the Hurtle — Thorn approximation.

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

III a. Within ICRANet

III b. Outside ICRANet

Research fellow at the of the Center for theoretical physics, Institute of Physics, National Academy of Science of Republic of Belarus, and of ICRANet-Minsk.

IV. Other

2016 List of Publication

Sigismondi Costantino

Position: Professor
Period covered: November 2015/ November 2016

I Scientific Work

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

Selection of Relativistic themes to high school students and published in icra.it/gerbertus with the 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 continued until october 2016 and observations of Perseid and Piscis Austrinids meteor showers.

Instrumental study to understand the anomaly of the measures of the solar diameter with the heliometer of Rio de Janeiro National Observatory.

Observation of the transit of Mercury over the solar disk to recover the actual diameter of the Sun. Coordination of the international campaign for these observations.

Observations of three Aldebaran's occultations (23.12, 29.7, 19.10), two of them in daylight and one from the observatory of Asiago, the largest in Italy, to measure the stellar diameter and to test the AQUEYE device.

II Conferences and educational activities
II a Conferences and Other External Scientific Work

Three public conferences December 21, 22 and 23 2015, January 28, March 20 and June 21, 2016 with Public observations of the meridian transit of the Sun at the Basilica of Santa Maria degli Angeli in Rome.

International congress on Gerbert of Aurillac, scientist and Pope of year 1000, focused on Planetary Transits in Sapienza University, the 9th of May 2016.

Link

www.icra.it/gerbertus

Conferences in Cosmology and Fundamental Physics at University Regina Apostolorum:

the inauguration's one on 11 October 2016 link

http://www.upra.org/evento/padre-georges-lemaitre-la-teoria-del-big-bang/

102nd Congress of Italian Physical Society, Padova University September 2016

From Giotto to Rosetta, Conference of cometary science, Padova Botanical Garden, October 2016

II b Work With Students

Domenico Cicogna, Francesco Castiglioni and Felipe Cardoso 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.
Giorgio Rossi
Alberto Vignati
Luigi Gatti
Anna Porchetti

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 2015-6 and on the measurements of the solar diameter with the transit of Mercury. 30 september 2016

III b. Outside ICRANet

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

IV. Other

Nov 2015-Nov 2016 List of Publication

1 2016Gerb...10...57S
09/2016
Sigismondi, Costantino
Sciami meteorici minori d'Agosto: le Piscis Austrinidi, le alfa Capricornidi e le delta Acquaridi meridionali
2 2016Gerb...10...49S
09/2016

Sigismondi, Costantino
Fotometria col filtro LPR alla nova V5668 SGR
3 2016Gerb...10...39S
08/2016
Sigismondi, Costantino
Penumbral lunar eclipse of September 16, 2016: observing with sunglasses to make it popular
4 2016Gerb...10...41S
07/2016
Sigismondi, Costantino
Azimut e altezza della Piramide Cestia in una sola osservazione del Sole e dell'ombra proiettata
5 2016Gerb...10...29S
07/2016
Sigismondi, Costantino
Metrologia: uno sguardo alle grandezze fisiche fondamentali; il Pendolo, il Piano Inclinato e g
6 2016cosp...41E..77H
07/2016
Humberto Andrei, Alexandre; Penna, Jucira; Boscardin, Sergio; Papa, Andres R. R.; Garcia, Marcos Antonio; Sigismondi, Costantino
42 years of continuous observations of the Solar 1 diameter from 1974 to 2015 - What do they forecast.
7 2016arXiv160706601S
07/2016
Sigismondi, Costantino
Lo Gnomone Clementino Astronomia Meridiana in Basilica
8 2016Gerb...10...23S
06/2016
Sigismondi, Costantino
La Luna all'orizzonte: rifrazione, estinzione e parallasse
9 2016Gerb...10....1S
06/2016
Sigismondi, Costantino
Allineamenti di tre basiliche romane con il Sole
10 2016Gerb...10...43S
05/2016
Sigismondi, Costantino
Il transito di Mercurio osservato da Jean Gambart il 5 maggio 1832: analisi ed eliometria
11 2016Gerb...10...27M
05/2016
Marino, Cesare; Sigismondi, Costantino
La numerazione digitale delle fasi lunari tra gli Indiani Lakota
12 2016Gerb...10....3S
05/2016
Sigismondi, Costantino
Da Aristotele a Zichichi, 40 fisici per la maturita'
13 2016Gerb....9..109S

05/2016
Sigismondi, Costantino
Algoritmi per il calcolo dell'epatta della Luna
14 2016Gerb....9..105C
05/2016
Cuevas Cardona, Salvador; Sigismondi, Costantino
Mercury transit at the rotonda of Santa Maria degli Angeli on May 9th 2016
15 2016Gerb....9..103S
05/2016
Sigismondi, Costantino
I termini di Cassini e Laplace della rifrazione atmosferica misurati alla Meridiana Clementina
16 2016Gerb....9...95S
05/2016
Sigismondi, Costantino
Visual timinigs of four 2015 mutual eclipses of Galileian satellites compared with the ephemerides
17 2016Gerb....9...91S
05/2016
Sigismondi, Costantino
Osservazioni dell'eclissi penombrale di Luna
18 2016Gerb....9...87S
05/2016
Sigismondi, Costantino; Castiglioni, Francesco; Cicogna, Domenico; Cardoso, Felipe
The solar diameter on 9 March 2016, from the total eclipse in Micronesia: at its standard value
19 2016Gerb....9...83S
05/2016
Sigismondi, Costantino; Castiglioni, Francesco; Cicogna, Domenico; Cardoso, Felipe
The opportunity of the 2016 transit of Mercury for measuring the solar diameter
20 2016Gerb....9...75S
05/2016
Sigismondi, Costantino
L'algebra dei transiti planetari sul Sole
21 2016Gerb....9...41S
05/2016
Sigismondi, Costantino; Ricciardi, Lorenzo
Fasi fenologiche di Cupressus Sempervirens all'IIS Caffè, a Roma durante l'inverno 2016
22 2016Gerb....9...35S
05/2016
Sigismondi, Costantino
Dinamica numerica di microsonde verso Alfa Centauri con impulsi LASER su vele spaziali
23 2016Gerb....9...31S
05/2016
Sigismondi, Costantino
Misura dell'azimut della Piramide Cestia col Sole
24 2016Gerb....9...27S
05/2016

Sigismondi, Costantino

Fotogrammetria dell'Obelisco Vaticano con il Sole

25 2016Gerb....9...21S

05/2016

Sigismondi, Costantino

Misure di massa nel 1574 del Sangue del Miracolo Eucaristico di Lanciano

26 2016Gerb....9...13S

05/2016

Sigismondi, Costantino

Declinazione magnetica: storia delle prime misure e misura con l'azimut del Sole

27 2016Gerb....9....1S

05/2016

Sigismondi, Costantino

Prefazione al volume 9 di Gerbertus in Transitu Mercurii

28 2016arXiv160502084S

05/2016

Sigismondi, Costantino

The opportunity of the 2016 transit of Mercury for measuring the solar diameter and recommendations for the observation

29 2016ATel.8618....1S

01/2016

Sigismondi, Costantino

Delta Scorpii unusual brightening to first magnitude

30 2015arXiv151208743A

12/2015

Andrei, Alexandre H.; Boscardin, Sergio C.; Penna, Jucira L.; Leister, Nelson V.; Sigismondi, Costantino

42 Years of Continuous Observations of the Solar Diameter from 1974 to 2015

31 2015arXiv151203358B

12/2015

Boscardin, Sergio C.; Sigismondi, Costantino; Penna, Jucira L.; D'Avila, Victor; Reis-Neto, Eugenio; Andrei, Alexandre H.

The Reflecting Heliometer of Rio de Janeiro after 6 Years of Activity

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-12 XIIth International Conference on Gravitation, Astrophysics and Cosmology Peoples' Friendship University of Russia (PFUR), Moscow, Russia, June 28-July 5, 2015

9th International Conference "Modern Achievements of Physics and Fundamental Physical Education", Faculty of Physics and Technology, Institute of Experimental and Theoretical Physics, The National Laboratory of Nanotechnology, Al Farabi Kazakh National University in Almaty, Kazakhstan,12-14 October, 2016.

Workshop Phenomenology of Strong Gravity, Physics Department of Nazarbayev University, Astana, Kazakhstan, 14-16 September, 2016

II b Work With Student

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

II c Diploma thesis supervision

Manas Hasanov, Nurzat Kenzhebayev, Amankhan Talkhat, Aygerim Abylayeva

II d Other Teaching Duties

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

II e. Work With Postdocs

Toktarbay Saken

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

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

IV. Other

2016 List of Publication

Abishev, ME; Boshkayev, KA; Dzhunushaliev, VD; Ivashchuk, VD. Dilatonic dyon black hole solutions. CLASSICAL AND QUANTUM GRAVITY, 2015, 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

M. Abishev, K. Boshkayev, H. Quevedo, S. Toktarbay. A perfect-fluid spacetime for a slightly deformed mass. Proceedings of XIIth International Conference on Gravitation, Astrophysics, and Cosmology pp.246-247. 2016.

M. Abishev, K. Boshkayev, H. Quevedo, S. Toktarbay. Accretion disks around a mass with quadrupole. Proceedings of XIIth International Conference on Gravitation, Astrophysics, and Cosmology. P.185-186. 2016.

Ansoldi Stefano

Position: full time researcher, University of Udine, Italy
Period covered:

I Scientific Work

Research topics/projects

1. Vacuum decay with wormhole creation, and its effects in the early universe (in collaboration with Takahiro Tanaka)
2. Realization of the maximum curvature hypothesis in *f(R)* theories (in collaboration with Eduardo Guendelman, Hideki Ishihara, Yuki Sakakihara)
3. Electromagnetic follow-up of gravitational wave alerts (within MAGIC collaboration)
4. Long term multiwavelength study of Mrk401 and Mrk501 with the MAGIC telescopes (within MAGIC collaboration)

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Talks

1. 2016, May 24: *Regular spacetimes with horizons and lightlike branes*, Cosmology Seminar, Kyoto University, Japan
2. 2016, July 8: *Vacuum decay and gravity*, Colloquium, Department of Physics, Graduate School of Science, Theoretical AstroPhysics group (TAP), Kyoto University, Japan
3. 2016, August 27: *On Tunneling with Wormhole Creation*, talk given at the "APCosPA-Planet^2 RESCEU Summer School", August 24-28, 2016; Takayama city, Japan
4. 2016, October 27: *On upward tunneling*, talk given at the "The 26th Workshop on General Relativity and Gravitation in Japan (JGRG26)", October 24-28, 2016; Osaka city University, Osaka, Japan

Outreach activities

1. 2016, June 24: *Einstein's relativity and beyond*, JSPS Science Dialogue, Wakasa High School, Obama, Japan (in collaboration with Yuki Sakakihara)

II b Work With Students

Undergraduate thesis

1. Veronica Pasquarella (supervisor): *Selected topics in gravitational physics*
2. Alice Boldrin (supervisor): *Chasing time: selected ideas about time in physics*
3. Luca Bertossa (supervisor): *Mathematics and physics of gravitational waves* (in Italian, *La matematica e la fisica delle onde gravitazionali*)
4. Fabio Mardero (supervisor): *Low-speed and high-speed magneto-hydrodynamics* (in Italian, *Studio delle differenze tra fenomeni magnetoidrodinamici a bassa velocita` e a regime relativistico*)

Master thesis

1. Nicolo` Cangiotti (co-supervisor, in collaboration with Sebastiano Sonego, Vittorino Talamini): *A discrete approach to quantum gravity*
2. Simone Peirone (supervisor, in collaboration with Stefano Borgani, Alessandra Silvestri, Matteo Viel): *Effective field theory and galaxy clusters as cosmological tests of modified gravity*
3. Fabio Decolle (supervisor), *in progress*: *Gravity as a gauge theory: technical aspects and recent developments* (in Italiano, *Formulazione della gravita` come una teoria di gauge: aspetti tecnici e sviluppi recenti*)
4. Francesco Maria Fabbri (co-supervisor, in collaboration with Bruno Giacomazzo), *in progress: Numerical simulation of neutron star mergers*

PhD thesis

1. Rachele Desiante (supervisor, in collaboration with Francesco Longo): *Gamma-Ray Transients observed with theFermiLargeArea Telescope*
2.

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

Teaching:

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

IV. Other

2016 List of Publication

1) *Constraining f(R) Gravity with Planck Sunyaev-Zel'dovich Clusters*, S. Peirone, M. Raveri, M. Viel, S. Borgani, S. Ansoldi, arXiv:1607.07863

2) *Multiwavelength observations of a VHE gamma-ray flare from PKS 1510-089 in 2015*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC Collaboration), arXiv:1610.09416

3) *Very High-Energy Gamma-Ray Follow-Up Program Using Neutrino Triggers from IceCube*, M. G. Aartsen, …, S. Ansoldi, *et al.* (IceCube and MAGIC and VERITAS Collaborations), arXiv:1610.01814

4) *Detection of very high energy gamma-ray emission from the gravitationally-lensed blazar QSO B0218+357 with the MAGIC telescopes*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC Collaboration), arXiv:1609.01095

5) *Long-term multi-wavelength variability and correlation study of Markarian 421 from 2007 to 2009*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC Collaboration), Astron. Astrophys. **593** (2016) A91, DOI:10.1051/0004-6361/201628447 [arXiv:1605.09017]

6) *Multiwavelength observations of the blazar 1ES 1011+496 in Spring 2008*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC and AGILE Collaborations), Mon. Not. Roy. Astron. Soc. **459** (2016) 2286, DOI:10.1093/mnras/stw710 [arXiv:1603.07308]

7) *Super-orbital variability of LS I +61°303 at TeV energies*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC Collaboration), Astron. Astrophys. **591** (2016) A76, DOI:10.1051/0004-6361/201527964 [arXiv:1603.06973]

8) *Insights into the emission of the blazar 1ES 1011+496 through unprecedented broadband observations during 2011 and 2012*, J. Aleksić, S. Ansoldi, *et al.* (MAGIC Collaboration), Astron. Astrophys. **591** (2016) A10, DOI:10.1051/0004-6361/201527176 [arXiv:1603.06776]

9) *Investigating the peculiar emission from the new VHE gamma-ray source H1722+119*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC and Fermi-LAT Collaborations), Mon. Not. Roy. Astron. Soc. **459** (2016) 3271, DOI:10.1093/mnras/stw689 [arXiv:1603.06523]

10) *Search for VHE gamma-ray emission from Geminga pulsar and nebula with the MAGIC telescopes*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC Collaboration), Astron. Astrophys. **591** (2016) A138, DOI:10.1051/0004-6361/201527722 [arXiv:1603.00730]

11) *MAGIC observations of the February 2014 flare of 1ES 1011+496 and ensuing constraint of the EBL density*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC Collaboration), Astron. Astrophys. **590** (2016) A24, DOI:10.1051/0004-6361/201527256 [arXiv:1602.05239]

12) *Deep observation of the NGC 1275 region with MAGIC: search of diffuse γ-ray emission from cosmic rays in the Perseus cluster*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC Collaboration), Astron. Astrophys. **589** (2016) A33, DOI:10.1051/0004-6361/201527846 [arXiv:1602.03099]

13) *Limits to dark matter annihilation cross-section from a combined analysis of MAGIC and Fermi-LAT observations of dwarf satellite galaxies*, M. L. Ahnen, S. Ansoldi, *et al.* (MAGIC and Fermi-LAT Collaborations), JCAP **1602** (2016) 039, DOI:10.1088/1475-7516/2016/02/039 [arXiv:1601.06590]

14) *Multiwavelength Study of Quiescent States of Mrk 421 with Unprecedented Hard X-Ray Coverage Provided by NuSTAR in 2013*, M. Baloković, …, S. Ansoldi, *et al.* (NuSTAR Team and VERITAS and MAGIC Collaborations) Astrophys. J. **819** (2016) 156, DOI:10.3847/0004-637X/819/2/156 [arXiv:1512.02235]

15) *Teraelectronvolt pulsed emission from the Crab pulsar detected by MAGIC*, S. Ansoldi *et al.* (MAGIC Collaboration), Astron. Astrophys. **585** (2016) A133, DOI:10.1051/0004-6361/201526853 [arXiv:1510.07048]

16) *The major upgrade of the MAGIC telescopes, Part II: A performance study using observations of the Crab Nebula,* J. Aleksić, S. Ansoldi, *et al.* (MAGIC Collaboration), Astropart. Phys. **72** (2016) 76, DOI:10.1016/j.astropartphys.2015.02.005 [arXiv:1409.5594]

17) *Measurement of the Crab Nebula spectrum over three decades in energy with the MAGIC telescopes*, J. Aleksić, S. Ansoldi, *et al.* (MAGIC Collaboration), JHEA **5-6** (2015) 30, DOI:10.1016/j.jheap.2015.01.002 [arXiv:1406.6892]

18) *Very High Energy follow-up programs of GW and transient alerts with the MAGIC telescopes*, A. Carosi, S. Ansoldi, L. A. Antonelli, A. Berti, B. De Lotto, F. Longo, A. Stamerra (for the MAGIC Collaboration), to appear in the proceedings of "The 6th International Symposium on High-Energy Gamma-Ray Astronomy (Gamma2016)", 11-15 July, 2016; Heidelberg, Germany.

Bernal Cristian Giovanny

Position: Professor/Researcher

Period covered: 2016 to date

University: Instituto de Matemáticas, estatística e Física, Universidade Federal de Rio Grande (Brazil)

I Scientific Work

Working with high energy astrophysical phenomena, focusing in supernovae, neutron stars and numerical simulations of accretion flows.

II Conferences and educational activities

II a Latin American Regional IAU Meeting (LARIM 2016)
II a International Workshop on Astronomy and Relativistic Astrophysics (IWARA 2016)

II b Lectures on High energy astrophysics and gamma ray burst (FURG 2016)

II c Thesis supervision: Hot stellar wind interaction, a numerical approach.

II d Teaching Duties: Classical Mechanics, an introduction to astrophysics, fundamental physics

II e. Work With Postdocs: Not yet

III. Service activities

III a. Within ICRANet: Research partnership in Pescara (Italy)

III b. Outside ICRANet: Research partnership in UFF (Brazil)

2016 List of Publication

1. A central compact object in Kes 79, the hypercritical regime and neutrino expectation, MNRAS ***462,*** *3646–3659 (2016)*

2. On the evolution of a buried magnetic field in young supernovae, International Journal of Modern Physics (accepted 2016)

Gadri Mohamed

Position: Teaching staff member in physics department since 1983
Period covered: 33 years

Scientific Work

Writing books, publishing many papers, in solid state physics, in Astrophysics named binary stars and mass transfer.

Conferences and educational activities

I have participated in almost MG conferences and **ICRAnet** activities

2016 List of Publication

Nil

Marcelo Moraes Guzzo

Position: Bolsista de Produtividade em Pesquisa do CNPq - Nível 1C - CA FA - Física e Astronomia

I Scientific Work

1. Fisica de particulas e campos

2. Fisica e astrofisica de neutrinos

II Conferences and educational activities

1. GUZZO, M. M.. A Partícula de Higgs: da Necessidade à Descoberta. 2013. (Apresentação de Trabalho/Conferência ou palestra).

2. Guzzo, M.M.. Café com Química: neutrinos. 2013. (Apresentação de Trabalho/Outra).

3. Guzzo, M.M.. UNICAMP Itinerante: Partículas Elementares. 2013. (Apresentação de Trabalho/Seminário).

4. Guzzo, M.M.. Introdução à Partículas Elementares. 2012. (Apresentação de Trabalho/Seminário).

5. Guzzo, M. M.. Convite à Física - USP. 2012. (Apresentação de Trabalho/Seminário).

6. GUZZO, M. M.. O Discreto, Charmoso e Estranho Mindo das Partículas Elementares. 2011. (Apresentação de Trabalho/Seminário).

7. GUZZO, M. M.. Neutrinos: partículas fantasmas. 2011. (Apresentação de Trabalho/Seminário).

8. GUZZO, M. M.. Introdução ao Modelo Padrão das Partículas Elementares. 2011. (Apresentação de Trabalho/Seminário).

9. GUZZO, M. M.. Sondando fundamentos da Física através do fenômeno de oscilações de neutrinos. 2010. (Apresentação de Trabalho/Outra).

10. GUZZO, M. M.. Particulas Elementares: Belas, Estranhas e Charmosas. 2006. (Apresentação de Trabalho/Seminário).

11. GUZZO, M. M.. Física de Partículas. 2005. (Apresentação de Trabalho/Seminário).

12. GUZZO, M. M.. Encerramento do Ano Internacional da Física: Neutrinos. 2005. (Apresentação de Trabalho/Seminário).

13. GUZZO, M. M.. Neutrinos: Pesando as Partículas Fantasmas. 2005. (Apresentação de Trabalho/Seminário).

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

1. 1o. Encontro do CCT da UNIFAL.Nobel de Física 2015: oscilações de neutrinos. 2015. (Seminário).

2. Nobel de Física 2015: oscilações de neutrinos.Nobel de Física 2015: oscilações de neutrinos. 2015. (Seminário).

3. Semana de Cursos de Licenciatura Física e Matemática UFSCar.Nobel de Física 2015: oscilações de neutrinos. 2015. (Seminário).

4. Semana de Cursos de Licenciatura Física e Matemática UFSCar. O estarnho mundo das partículas elementares. 2014. (Congresso).

5. Colóquio do IFGW.Nobel de Física de 2013: A origem da massa das partículas elementares. 2013. (Seminário).

6. Curso de Verão.Partícula de Higgs: da Necessidade à Decoberta. 2013. (Seminário).

7. Aula Magna Inaugural do Curso de Física do IFSC USP.Neutrino: partícula misteriosa, onipresente e... superluminar?. 2012. (Seminário).

8. Colóquio do Instituto de Física Gleb Wataghin.Evidências da descoberta da partícula de Higgs. 2012. (Seminário).

9. Paraninfo da Turma de Bacharelado em Física.Paraninfo da Turma de Bacharelado em Física. 2012. (Outra).

2016 List of Publication

1. Guzzo, M.M.; PEIXOTO, C. F. ; de Holanda, P. C. . Cosmological bounds of sterile neutrinos in a $SU(3)_C\otimes SU(3)_L\otimes SU(3)_R\otimes U(1)_N$ model as dark matter candidates. Brazilian Journal of Physics (Impresso), v. 1, p. 1, 2016.

2. Guzzo, M.M.; PERES, O. L. G. ; PICORETI, R. . Neutrino Decay and Solar Neutrino Seasonal Effect. Physics Letters. B (Print), v. 1, p. 1, 2016.

3. GUZZO, MARCELO M.; DE HOLANDA, PEDRO C. ; OLIVEIRA, ROBERTO L.N. . Quantum dissipation in a neutrino system propagating in vacuum and in matter. Nuclear Physics. B (Print), v. 1, p. 1, 2016.

4. ZAVANIN, E.'M. ; GUZZO, M.'M. ; DE HOLANDA, P.'C. ; PERES, O.'L.'G. . Confronting the stochastic neutrino mixing mechanism with the sterile neutrino hypothesis as a solution to the short

baseline neutrino anomalies. Physical Review. D, Particles, Fields, Gravitation, and Cosmology, v. 91, p. 1, 2015.

5. GIRARDELLI, DAVID ; GUZZO, MARCELO . Neutrino Non-standard Interactions. Physics Procedia, v. 61, p. 704-707, 2015.

6. GIRARDELLI, DAVID ; ZAVANIN, EDUARDO M. ; GUZZO, MARCELO M. . Equivalência entre a mecânica quântica e a mecânica quântica PT simétrica. Revista Brasileira de Ensino de Física (Online), v. 37, p. 1304, 2015.

7. OLIVEIRA, R.'L.'N. ; GUZZO, M.'M. ; DE HOLANDA, P.'C. . Quantum dissipation and CP violation in MINOS. Physical Review. D, Particles, Fields, Gravitation, and Cosmology, v. 89, p. 1-9, 2014.

Citações:2

8. ESMAILI, A. ; GRATIERI, D. ; HOLANDA, P.C. ; Peres, O L G ; VALDIVIESSO, G.A. ; GUZZO, M. M. . Constraining the violation of the equivalence principle with IceCube atmospheric neutrino data. Physical Review. D, Particles, Fields, Gravitation, and Cosmology, v. 89, p. 113003, 2014.

Citações:3

9. GUZZO, M. M.; Oliveira, R. L. N. . Dissipation and theta_13 in neutrino oscillations. European Physical Journal. C, Particles and Fields (Print), v. 73, p. 1-9, 2013.

Citações:2

10. GUZZO, M. M.; HOLANDA, P. C. de ; de Holanda, P. C. ; PERES, O. L. G. ; ZAVANIN, E. M. . Stochastic neutrino mixing mechanism. Physical Review. D, Particles, Fields, Gravitation, and Cosmology, v. 87, p. 093003, 2013.

Citações:1

11. F. R. Torres ; GUZZO, M. M. ; HOLANDA, P. C. ; PERES, O. L. G. . A New Parametrization of Mass Varying Neutrinos Applied in Supernovae. Nuclear Physics. B, Proceedings Supplement (Print), v. 1, p. 1-2, 2012.

12. VALDIVIESSO, G.A. ; Guzzo, M.M. ; HOLANDA, P.C. . Equivalence Principle from the Solar and Reactor Neutrino Observations. Nuclear Physics. B, Proceedings Supplement (Print), v. 229-232, p. 452, 2012.

13. VALDIVIESSO, G. ; GUZZO, M. M. ; HOLANDA, P. C. . Probing New Limits for the Violation of the Equivalence Principle in the Solar-Reactor Neutrino Sector as a Next to Leading Order Effect. Physics Letters. B (Print), v. 1, p. 1-5, 2011.

Citações:1 | 1

14. D.V. Forero ; Guzzo, M. M. . Constraining Non-Standard Interactions with Electrons. Physical Review. D, Particles, Fields, Gravitation, and Cosmology, v. 1, p. 1-1, 2011.

15. F. R. Torres ; GUZZO, M. M. ; Holanda, P C de ; Peres, O L G . Mass varying neutrinos in supernovae. Physical Review. D, Particles, Fields, Gravitation, and Cosmology, v. 1, p. 1-1, 2011.

Citações:2|2

16. Bernardini, A.E. ; Guzzo, M.M. ; Nishi, C.C. . Quantum flavor oscillations extended to the Dirac theory. Fortschritte der Physik (Berlin. Wiley-VCH), v. 59, p. 372-453, 2011.

Citações:4|4

17. Oliveira, R. L. N. ; GUZZO, M. M. . Quantum dissipation in vacuum neutrino oscillation. European Physical Journal C, p. 1, 2010.

Citações:4|4

18. F. R. Torres ; Guzzo, M. M. ; Holanda, P C de . R-process and mass varying neutrinos. Journal of Physics. Conference Series (Print), v. 203, p. 1, 2010.

Citações:1

19. Guzzo, M. M.; F. R. Torres . Neutrinos de Massa Variável. Physicae (APGF), v. 9, p. 1, 2010.

20. C. A. Moura Jr. ; GUZZO, M. M. . New analyses of Double-Bang Events in the Atmosphere. Brazilian Journal of Physics, v. 38, p. 219-226, 2008.

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. Lepton flavor violating decays of Standard-Model-like Higgs in 3-3-1 model with neutral lepton, L. T. Hue, H. N. Long, T. T. Thuc, and T. Phong Nguyen, [arXiv:1512.03266(hep-ph)]; *Nucl. Phys.* **B 907**, (2016) 37 -- 76.
2. A 3-3-1 model with right-handed neutrinos based on the $\Delta\left(27\right)$ family symmetry, A. E. C\'arcamo Hern\'andez, H. N. Long, V. V. Vien, [arXiv:1601.05062 (hep-ph)], Eur. Phys. J **C 76**, No. 5, (2016) 242 (17 pages)
3. Lepton flavor violating decay of SM-like Higgs in a radiative neutrino mass model, T. T. Thuc, L. T. Hue, H. N. Long, T. Phong Nguyen, [arXiv:1604.03285(hep-ph)], Phys. Rev. D **93**, 115026 (2016) (14 pages)
4. Electroweak theory based on $SU(4)_L \otimes U(1)_X$ gauge group, H. N. Long, L. T. Hue, D. V. Loi, [arXiv:1605.07835(hep-ph)], Phys. Rev. D **94**, 015007 (2016) (22 pages),
5. The $\Delta (27)$ flavor 3-3-1 model with neutral leptons, V. V. Vien, A. E. C\'arcamo Hern\'andez and H. N. Long, [arXiv:1601.03300(hep-ph)]. Nucl. Phys. **B 913**, (2016), pp. 792-814.
6. Signal of doubly charged Higgs at e^+e^- colliders, L. T. Hue, D. T. Huong, H. N. Long, H. T. Hung, N. H. Thao, [arXiv:1404.5038(hep-ph)], *Progress of Theoretical and Experimental Physics* (PTEP), 2015, vol. **11**. 113B05 (35 pages)

II. Conferences and educational activities

II a. Conferences and Other External Scientific Works:

- *Editor of journal of Vietanm:* ***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 Unicersity

II c. Diploma thesis supervision: I am supervisor for5 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: V. Q. Phong and L. T. Hue

III. Service activities

III a. Within ICRANet: I hope to visit ICRANET next year 2017

III b. Outside ICRANet:

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

Kim, Hyeong-Chan

Position: Professor, School of Liberal Arts and Sciences,
Korea University of transportation,
Period covered: 2009- present

I Scientific Work

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

2016 List of Publication

Equation of state in the presence of gravity, arXiv:1608.03409, to appear in JKPS

Preprints:

Classifying self gravitating radiations, arXiv:1601.02720, submitted to PRD

The M-sigma Relation of Super Massive Black Holes from the Scalar Field Dark Matter: arXiv:1512.02351, submitted to JHEP

Static Fluid Blackholes, arXiv:1610.04087, submitted to Phys. Lett. B.

Matter Equation of State in General Relativity, arXiv:1611.00452 .

Kim, Jin Young

Position: professor
Period covered:

I Scientific Work

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2016 List of Publication

J.Y. Kim and M.-I. Park, On a new approach for constructing wormholes in Einstein-Born-Infeld gravity, arXiv. 1608.00445 (to appear Eur. Phys. J. C)

J. Y. Kim, Wormhole solution in non-standard theory of general relativity, New Physics: Sae Mulli, 66, 82 (2016)

Park Myeong-Gu

Position: Visiting Scientist
Period covered: 1st Sep. 2015 ~ 31st Aug. 2016

I Scientific Work

Physics of rotating viscous accretion flow

Exoplanet search around giant stars

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

III a. Within ICRANet

III b. Outside ICRANet

Teaching in Kyungpook National University, KOREA: Astrophysics 1, Advanced Astrophysics 1

IV. Other

2016 List of Publication

Byeong-Cheol Lee, Inwoo Han, Myeong-Gu Park, et al., Long-Period Variations in The Radial Velocity of Spectroscopic Binary M Giant μ Ursae Majoris, The Astronomical Journal 151(4):106/1-7 (2016.04)

Perez Martinez Aurora Maria

Position: Senior Researcher/Senior Professor
Period covered: 2016

I Scientific Work

-Study of lowly rotation magnetized white dwarfs.

-Study of the cosmological evolution of primordial magnetic fields.

-Study of Quantum Faraday effect in a weak magnetized medium and their astrophysical and cosmological implications.

- Study of Constraints braneworld from compact stars.

-Study of Neutrino propagation in magnetized media, pulsar kicks.

II Conferences and educational activities 2016

1. 2015 Miami 2015 Conference on elementary particle physics, astrophysics, and cosmology 16-22 December, Fort Lauderdale, Florida: work presented "Anisotropic EoS and stellar structure equations for magnetized compact stars".
2. Summer School of Science at FAIR, Havana, Abril 18-22 2016. work presented: "Quark dense matter in presence of magnetic field. Applications to Astrophysics."
3. High energy Physics and Strings II, Havana Julio 18-22 2016.work presented: "Neutrino propagation in magnetized quark stars: Pulsar kick."

II b Work With Students.

-Supervision of the master thesis of Diana Alvear Terrero from ICIMAF (in progress).

II c Diploma thesis supervision

-Diploma thesis of Faculty of Physics, Enanas Blancas en rotación, Miguel Castillo García, Faculty of Physics, Havana University. Havana discussion March 4th 2016

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

-Kick of magnetized quark stars

III. Service activities

II a. Within ICRANet

1. Discussion of topics of common interest with Kuantay Boshkayev about rotating White Dwarfs

2. *III b. Outside ICRANet*

   Sabbatical position of Consejo Nacional de Ciencia y Tecnologia (CONACYT), Grant 264150 at Instituto de CienciasNucleares (ICN) UNAM from March 2016-february 2017

   Collaboration:

   1) Collaboration with Gabriella Piccinelli from FES Aragon UNAM, Angel Sanchez from Facultad de Ciencias UNAM, Alejandor Ayala from Instituo de Ciencias Nucleares UNAM and Daryel Manreza Paret from Havana University in the field: neutrino propagation in magnetized dense media and kicks of magnetized quark stars.

   2) Collaboration with Gabriella Piccinelli from FES Aragon UNAM, Quantum Faraday rotation for weak magnetic field and astrophysical and cosmological applications.

   3) Collaboration with R. González Felipe from CFTP, Instituto Superior Tecnico de Lisboa and Daryel Manreza Paret from Havana University. Constraints braneworld from compact stars.

   Seminar at the Department of Gravitation and Field Theory ICN-UNAM Mexico, May 26 2016 entitled: Anisotropies impact on the structure of magnetized compact objects.

IV. Other

Member of IAC (IWARA 2016) Gramado Brazil, October 2016.

Organization of conferences and school:

First Summer Cuban- German Summer School. Summer School of Science at FAIR, Havana, Abril 18-22 2016

High energy Physics and Strings II, Havana Julio 18-22 2016.

International conferences: stars2017/smfns2017 May 2017

Reviewer of paper of the European Journal of Physics D.

2016 List of Publication

1 Constraints on the braneworld from compact stars. R. González Felipe D. Manreza Paret and A. Pérez Martínez arXiv:1601.01973v1 Eur. J Phys. C 76:337. (2016) DOI 10.1140/epjc10052-016-4177-7

2. A non-perturbative study of the evolution of cosmic magnetized sources. I. Delgado Gaspar, A Perez Martinez, G. Piccinelli and Roberto A Sussman. arXiv:1504.06892. Class Quantum Gravity Gen. Relativ. Gravit. (2016) 48:7. DOI 10.1007/s10714-015-2004-3 2015

Qadir Asghar

Position: Professor Emeritus
Period covered: 2011 – 2016

I Scientific Work:

1. "Some extensions of the Fermi-Dirac and Bose-Einstein functions with applications to the family of the zeta and related functions" by H.M. Srivastava, M.A. Chaudhry, **A. Qadir** and A. Tassaddiq, Russian J. Math. Phys. **18** (2011) 107 - 121.

2. "Estimating the parameters of the Sgr A* black hole", F. De Paolis, G. Ingrosso, A. A. Nucita, **A. Qadir** and A. F. Zakharov, Gen. Rel. & Gravit. **43** (2011) 977 – 988.

3. "Primordial black holes in phantom cosmology", M. Jamil and **A. Qadir**, Gen. Rel. & Gravit. April **43** (2011) 1069 - 1082.

4. "Fourier transform and distributional representation of the generalized gamma function with some applications", A. Tassaddiq and **A. Qadir**, Applied Mathematics and Computation **218** (2011) 1084 – 1088.

5. "Inequivalence of classes of linearizable systems of cubically semi-linear ordinary differential equations obtained by real and complex symmetry analysis", S. Ali, **A. Qadir** and M. Safdar, Mathematical and Computational Applications **16** (2011) 923 – 934.

6. "Classification of ordinary differential equations by conditional linearizability and symmetry", F.M. Mahomed and **A. Qadir,** Communications in Nonlinear Science and Numerical Simulation **17** (2011) 573 - 584.

7. "Possible detection of the M31 rotation in WMAP data", F. De Paolis, V. G. Gurzadyan, G. Ingrosso, Ph. Jetzer, A. A. Nucita, **A. Qadir**, D. Vetrugno, A. L. Kashin, H. G. Khachatryan, and S. Mirzoyan, Astron. & Astrophys. **534** (2011) L8, 1 – 5.

8. "Fourier transform representation of the extended Fermi-Dirac and Bose-Einstein functions with applications to the family of the zeta and related functions", A. Tassaddiq and **A. Qadir**, Integral Transforms and Special Functions (2011) DOI 10.1080/10652469.2011.561002.

9. "A new generalization of the Riemann zeta function and its difference equation", M.A. Chaudhry, **A. Qadir** and A. Tassaddiq, Advances in Differential Equations **20** (2011) 13 pages.

10. "Linearizability of systems of ordinary differential equations obtained by complex symmetry analysis", by M. Safdar, **A. Qadir** and S. Ali, Mathematical Problems in Engineering **10.1155** (2011) 171834, 17 pages.

11. "Laplace-Type Semi-Invariants for a System of Two Linear Hyperbolic Equations by Complex Methods", by F. Mahomed, **A. Qadir** and A. Ramnarian, Mathematical Problems in Engineering (**2011**, 202973, 15 pages).

12. "Linearizability criteria for systems of two second-order differential equations by complex methods", S. Ali, F. M. Mahomed and A. Qadir, Nonlinear Dynamics **66** (2011) 77 - 88.

13. "Extension of Hardy's class for Ramanujan's interpolation formula and master theorem with applications", M.A. Chaudhry and **A. Qadir**, J. Ineqs. and Appl. **52** (2012) pages 1 to 13.

14. "A note on the extended complete and incomplete beta functions", K. Al-Baiyat, M.A. Chaudhry, B. Al-Humaidi and **A. Qadir**, International Journal of Applied Mathematics **25** (2012) 51 - 58.

15. "CMB as a possible new tool to study the dark baryons in galaxies", F. De Paolis, G. Ingrosso, A.A. Nucita, D. Vetrugno, V.G. Gurzadyan, A.L. Kashin, H.G. Khachatryan, S. Mirzoyan, Ph. Jetzer and **A. Qadir**, J. Phys. Conf. Series **354** (2012) 012004, 8 pages.

16. "Effect of accretion of phantom energy on initial mass of a primordial black hole", S. Naz and **A. Qadir**, J. Phys. Conf. Series **354** (2012) 012012, 7 pages.

17. "Self-interaction of gravitational waves and their observability", **A. Qadir**, J. Phys. Conf. Series **354** (2012) 012014, 8 pages.

18. "Noether symmetries of the area minimizing Lagrangian", A. Aslam and **A. Qadir**, *Journal of Applied Mathematics* (2012) ID 532690, 14 pages.

19. "Linearization: Geometric, conditional and complex", **A. Qadir**, *Journal of Applied Mathematics* (2012) ID 303960, 30 pages doi:10.1155/2012/303960.

20. "Generating vorticity and magnetic fields in plasmas in general relativity: spacetime curvature drive", F.A. Asenjo, S.M. Mahajan and **A. Qadir**, *Physics of Plasmas* **20** (2013) 22901 (8 pages).

21. "The effects of mass on the radiation of a relativistically rotating neutron star", R.S. Herbst, **A. Qadir**, and E. Momoniat, New Astronomy **25** (2013) 38 - 44.

22. "Lie symmetries of the Ricci and energy-momentum tensors", H. Khan, **A. Qadir**, K. Saifullah and M. Ziad, *Eur. Phys. J. Plus* **128** (2013) 144 (7 pages).

23. "Magnetic field seed generation in plasmas by spacetime curvature", **A. Qadir**, F.A. Asenjo and S.M. Mahajan, *Physica Scripta* **89** (2014) 084002, 7 pages.

24. "Planck confirmation of the M31 disk and halo rotation", F. De Paolis, V.G. Gurzadyan, A.A. Nucita, G. Ingrosso, A.L. Kashin, H.G. Khachatryan, S. Mirzoyan, **A. Qadir** and D. Vertugno, *Astron. and Astrophys.*, **565** (2014) L3 1 - 4.

25. "Reduction of fourth order ordinary differential equations to second and third Lie linearizable forms", H.M. Dutt and **A. Qadir**, *Comm. Nonlin. Sci. and Numerical Simulation*, **19** (2014) 2653 – 2659.

26. "Linearization from Complex Lie Point Transformations", S. Ali, M. Safdar, and **A. Qadir**, *Journal of Applied Mathematics*, **2014** (2014) 793247 (8 pages) doi:10.1155/2014/793247.

27. "Noether symmetries and isometries of the minimal surface Lagrangian under constant volume in a Riemannian space", A. Paliathanasis, **A. Qadir** and M. Tsamparlis, *International Journal of Geometric Methods in Modern Physics* **12** (2015) 1550003 (10 pages).

28. "Higher dimensional systems of differential equations obtainable by iterative use of complex methods", **A. Qadir** and F.M. Mahomed, *Int. J. Mod. Phys.* (*Conf. Ser.*) **38** (2015) 1560077 (19 pages), eds. S. Ali, F.M. Mahomed and A. Qadir.

29. "Sesquicentennial of the Presentation by James Clerk Maxwell of his paper 'A Dynamical Theory of the Electromagnetic Field' to the Royal Society of London", D.P. Mason and **A. Qadir**, *Int. J. Mod. Phys.* (*Conf. Ser.*) **38** (2015) 1560070 (23 pages), eds. S. Ali, F.M. Mahomed and A. Qadir.

30. "Fourier transform representation of the generalized hypergeometric functions with applications to the confluent and Gauss hypergeometric functions", M.H. Lail and **A. Qadir**, *Applied Mathematics and Computation* **263** (2015) 392 – 397.

31. "Planck revealed bulk motion of Centaurus A lobes", F. De Paolis, V.G. Gurzadyan, A.A. Nucita1, G. Ingrosso, A.L. Kashin, H.G. Khachatryan, S. Mirzoyan, G. Yegorian, Ph. Jetzer, **A. Qadir** and D. Vetrugno, *Astronomy & Astrophysics* **580** (2015) L8 DOI: http://dx.doi.org/10.1051/0004-6361/201526797).

32. "Fourier transform representation of the generalized hypergeometric functions with applications to the confluent and Gauss hypergeometric functions", M.H. Lail and **A. Qadir**, *Applied Mathematics and Computation* **263** (2015) 392 – 397.

Riahi Rashid

Position: Visiting-PhD student, Isfahan University of Technology (IUT), Isfahan, Iran
Period covered: 24 Aug 2016- 8 Feb 2017

I Scientific Work

Neutron Stars

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

III a. Within ICRANet

III b. Outside ICRANet

Lecturer in Islamic Azad University, Shahrekord Branch, Iran

IV. Other

2016 List of Publication

33. "Planck View of M82 Galaxy", V.G. Gurzadyan, F. De Paolis, A.A. Nucita1, G. Ingrosso, A.L. Kashin, H.G. Khachatryan, S. Mirzoyan, G. Yegorian, Ph. Jetzer, **A. Qadir** and D. Vetrugno, *Astronomy & Astrophysics* **582** (2015) A77, 4 pages.

34. "Invariant Linearization Criteria for a Three-Dimensional Dynamical System of Second-Order Ordinary Differential Equations and Applications", A. Aslam, F.M. Mahomed and **A. Qadir**, *International Journal of Non-Linear Mechanics* **78** (2016) 9 - 16.

35. "The Triangulum galaxy seen by Planck", F. De Paolis, V.G. Gurzadyan, A.A. Nucita, L. Chemin, **A. Qadir**, A.L. Kashin, H.G. Khachatryan, S. Sargsyan, G. Yegorian, G. Ingrosso, Ph. Jetzer, and D. Vetrugno, *Astronomy & Astrophysics* **593** (2016) A57 (7 pages).

36. "Modified relativistic dynamics", **A. Qadir**, H.W. Lee and K.Y. Kim, *Int. J. Mod. Phys. D* (to appear).

37. "Dark energy via multi-Higgs doublet models: accelerated expansion of the Universe in the two Higgs doublet model scenario", M. Usman and **A. Qadir**, *Int. J. Mod. Phys. D* (to appear).

38. "Gravitational Waves", **A. Qadir**, Journal of GeoSpace Science, **1** (2015) 1 – 18.

39. "Energy in gravitational waves", I. Hussain and **A. Qadir**, *Proc. 12th Marcel Grossmann Meeting* 2009, eds. R. Jantzen and R. Ruffini, (World Scientific 2012) pp. 1868 - 1873.

40. "The information loss paradox and the holographic principle", **A. Qadir**, *Proc. 13th Regional Conference on Mathematical Physics* 2010, (World Scientific 2013) pp. 171 - 181. "The wrapping of magnetic lines of force about a fast rotating neutron star", **A. Qadir**, R.S. Herbst and E. Momoniat, *Proc. 13th Marcel Grossmann Meeting* 2012, eds. R. Jantzen, K. Rosquist and R. Ruffini, (World Scientific 2015).

41. "Planck confirmation of the M31 disk and halo rotation", F. De Paolis, D. Vertugno, A.A. Nucita, G. Ingrosso, V.G. Gurzadyan, P. Jetzer and **A. Qadir**, *Proc. 13th Marcel Grossmann Meeting* 2012, eds. R. Jantzen, K. Rosquist and R. Ruffini, (World Scientific 2015).

42. "Radiative correction for generating magnetic fields in plasmas by spacetime curvature", **A. Qadir** and R.S. Herbst, *Proc. 14th Marcel Grossmann Meeting* 2012, eds. Massimo Bianchi, R. Jantzen and R. Ruffini, (World Scientific online 2016).

43. "Higgs dark energy in inert doublet model", M. Usman and **A. Qadir**, *Proceedings of the 14th Regional Conference on Mathematical Physics*, eds. J. Aslam and K. Saifullah, World Scientific (to appear).

II Conferences and educational activities

II a Conferences and Other External Scientific Work Participated in Organizing 5 international conferences and attended 2 more

II b Work With Students 22 international journal papers and 2 international conference proceedings with MS/M. Phil and PhD students of mine and collaborators.

II c Diploma thesis supervision Apart from research papers included above, supervised 5 PhD theses and 5 MS/M. Phil dissertations; guiding one PhD scholar and 4 MS scholars.

II d Other Teaching Duties 11 courses taught at MS/M. Phil and PhD and 1 at BS level

II e. Work With Postdocs 4 papers with postdocs with collaborators.

III. Service activities

III a. Within ICRANet Only paper at #36 from ICRANet

III b. Outside ICRANet All other activity on my own outside ICRANet

IV. Other

1. "Dr. Asghar Qadir Street", Jamshaid Town, Karachi, named after me;
2. Third and Fifth Joint Italian Workshops on Relativistic Astrophysics dedicated to me on my 65^{th} and 70^{th} birthdays;
3. One-day Workshop on my 65^{th} birthday held at the Department of Mathematics of Punjab University and for the 70^{th} birthday to be held on 26 November 2016.

2016 List of Publication Given above #s 34 – 37 and 42, 43.

Soroush Shakeri

Position: **PhD Visitor**
Period covered: **1 year-Since 2016-February**

I Scientific Work

Strong Field QED Phenomena (In Astrophysics and Ground Based Laser Experiments), Pulsar Physics (Polarization Characteristics), Early Universe Cosmology (Cosmological phase transitions), Non-Perturbative QCD based on Effective field theoretical model , Gamma Ray Bursts (Data analysis and their phenomenological aspects).

II Conferences and educational activities

II a Conferences and Other External Scientific Work

Summer school on particle physics , 15-26 Jun 2015, ICTP Trieste, Italy
The 21st international symposium on particles, strings and cosmology, 29 June to 3 July 2015, Trieste, Italy
- Fourteenth Marcel Grossmann Meeting - MGXIV of Rome (12-18 July, 2015), 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

III a. Within ICRANet

Lecture : "Afterglow: from synchrotron emission to polarization characteristics " Fourth Bego Rencontres -IRAP Ph.D. Erasmus Mundus school, May 30^{h} - June 3^{d}, 2016,Villa Ratti, Nice-Soroush Shakeri.
Lecture : "Nonlinear QED effects : From GRBs to High power lasers" Supernovae, Hypernovae and Binary Driven Hypernovae An Adriatic Workshop
Pescara - June 20-30, 2016-Soroush Shakeri.

"Generation of Circularly Polarizated Radio Wave from Pulsars via photon-photon interaction" M.Haghighat, S.Shakeri, presented as poster in Fourteenth Marcel Grossmann Meeting - MGXIV of Rome (12-18 July, 2015), Rome, Ital

III b. Outside ICRANet

Teaching Experiences :

Undergraduate Courses: *Quantum Mechanic(I), Basic Lab Physics, Payame Noor University of Ahvaz-IRAN-2012-2014*

Teacher Subjects at Isfahan University of Technology(IUT)-Isfahan-IRAN: *Foundations of Electromagnetic theory and Basic Lab Physics as undergraduate course,* ***2015-2016***

IV. Other

2016 List of Publication

"On the universal late X-ray emission of binary-driven hypernovae and its possible collimation" *G.B. Pisani, R. Ruffini, Y. Aimuratov, C.L. Bianco, M. Kovacevic, R. Moradi, M. Muccino, A.V. Penacchioni, J.A. Rueda,* ***S. Shakeri*** *Y. Wang****. APJ, 2016 [arXiv:1610.05619]***

*"****Analysis the phase diagram of QCD and predicting a little period of inflation in the QCD phase transition in the early Universe", S.Shakeri****, Hamid Reza Sepangi, Proceeding of the Spring Conference of Institute for Research in Fundamental Sciences(IPM), Tehran, Iran, Spring 2012.*

*"****Quark Confinement And Chiral Symmetry Breaking In The Early Universe", S.Shakeri,*** *Hamid Reza Sepangi, Proceeding of Annual Physics of Iran, Physics Society of Iran(PSI), Azad University, Tehran, Iran, January 2014.*

"Polarization of a probe laser beam due to the nonlinear QED effects" *,****S. Shakeri,*** *et al, submitted to PRA.2016*

Polarization changes of X-ray emission from Pulsars due to the nonlinear QED effects , S. Shakeri, *in preparation. 2016*

Sergio Torres

Position: Researcher
Centro Internacional de Física, Bogotá, Colombia

Period covered: 2016

I Scientific Work

Leading a research group studying cosmological models and analysis of cosmic background radiation data;

Principal investigator (1995) of the Galactic Emission Mapping (GEM) project in Colombia, consisting of an international collaboration to survey the galactic radiation in the 408 – 5000 MHz range.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

II b Work With Students

Cosmology Workshop, Universidad Nacional de Colombia, Bogotá, Colombia

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

Dynamical Astronomy in Latin America - ADeLA, Universidad de los Andes, Bogotá, September 28-30, 2016

IV. Other

2016 List of Publication

S. Torres, O. Restrepo, J. C. Cuervo, G. Chaparro, Analysis of Anisotropy in the Hubble Flow, TECCIENCIA, 2016

Chaparro Molano G., Restrepo Gaitan O. A., Cuervo J. C., and Torres S., "Bayesian Estimation of Uncertainties for Redshift Independent Distance Measurements in the NED-D Catalog", *Dynamical Astronomy in Latin America - ADeLA*, Universidad de los Andes, Bogotá, September 28-30, 2016

International Relativistic Astrophysics Ph. D.

Lecian Orchidea Maria

Position: Postdoctoral Research

Period covered: 2016

I Scientific Work

Postdoctoral research in Theoretical Physics; General Relativity.

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

DIAEE- Department of Astronautic, Electric and Energetics Engeneering, Sapienza University of Rome, Teaching Assistant for the lectures Fundamentals of Physics I, A.Y. 2016-2017; Faculty: Prof. Stefano Atzeni.

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2016 List of Publication

Giovanni Amelino-Camelia, Malú Maira da Silva, Michele Ronco, Lorenzo Cesarini, Orchidea Maria Lecian, Spacetime-noncommutativity regime of Loop Quantum Gravity , [arXiv:1605.00497].

Lorenzo Cesarini, Orchidea Maria Lecian, The Hamiltonian constraint and its possible deformations, in Proceedings of XIV Marcel Grossmann Meeting on General Relativity, Rome,

July 2015, in preparation.

Orchidea Maria Lecian, An analysis of the symmetries of cosmological billiards, in Proceedings of XIV Marcel Grossmann Meeting on General Relativity, Rome, July 2015, in preparation.

Cáceres Uribe, Diego Leonardo

Position: PhD. Student
Period covered: 2012 – 2016

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~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 Icra 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, Universitre 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 Repeaters 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, Universitre Nice Sophia Antipolis. 8 – 19 September 2014, Nice, France.*

- *"On the Spin-Down of Anomalous X-Ray Pulsars and Soft Gamma-Ray Repeaters 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.

2016 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. Caceres, 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 Repeaters". Jaziel Coelho, Rafael C. R. de Lima, Diego L. Caceres, 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. Caceres, Jaziel G. Coelho, Sheyse M. de Carvalho, Rafael C. R. de Lima, Jorge A. Rueda, Remo Ruffini. To be submitted.

Cipolletta Federico

Position: **IRAP PhD, XI Cycle**

Period covered: **October 2012 – March 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". Supervisor: prof. Riccardo Piergallini.

- 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". Supervisor: prof. Roberto Giambò.

- Ph.D. title (IRAP Ph.D., XI Cycle) obtained on 22/03/2016. Thesis' title: **"**Structure of rotating self- gravitating figures of equilibrium in Newtonian gravity and general relativity with an emphasis on neutron stars". Supervisors: prof. Simonetta Filippi and prof. Jorge A. Rueda.

- From April 2016 to October 2016, I obtained a short- term collaboration contract (6 months) with CNR group of prof. Sauro Succi, to work in Electrospinning. My job was to modify, test and implement a public domain Fortran code (JETSPIN), to numerically model the electrospinning process. Then I should statistically study the results (moment 1, 2 and 3 of distribution; interquartile range; joint probability; bidimensional histograms), in order to write scientific papers.

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 Frebruary 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 – Nice (France)

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

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

- "Supernovae, Hypernovae and Binary Driven Hypernovae - An Adriatic Workshop", June 20 2016
- Pescara (Italy)

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 Rotatng 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;

- *Structure of relativistic, rapidly rotating Neutron Stars: interior and exterior spacetime* during "Supernovae, Hypernovae and Binary Driven Hypernovae - An Adriatic Workshop", Pescara (Italy), June 20 2016.

IV. Other

- April 2016 – October 2016: Short- term collaboration contract with CNR group of prof. Sauro Succi in Rome.

2016 List of Publication

Proceedings:

- "Black holes, neutron stars and supernovae within the induced gravitational collapse paradigm for GRBs", L. Becerra, C. L. Bianco, F. Cipolletta et al. AIP Conf. Proc. 1693, 020002 (2015);

- "Physics and astrophysics of neutron stars", R. Belvedere, F. Cipolletta et al. AIP Conf. Proc. 1693, 030001 (2015);

Published Papers:

- "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;

- "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;

- "COLLAPSE OF SPHERICAL CHARGED ANISOTROPIC FLUID SPACETIMES", Federico Cipolletta and Roberto Giambó 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;

In Preparation:

- "On the mostly bound circular orbit around rapidly rotating neutron stars", Authors: F. Cipolletta, , S. Filippi, C. Cherubini, 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;

- "Suitability of Analytical Formulas for the Determination of the Neutron Star Keplerian Frequency and Moment of Inertia", Authors: R. Belvedere, J. A. Rueda, L. M. Becerra, F. Cipolletta, R. Ruffini;

- "On the equilibrium configuration for Newtonian rotating polytropes with a multi– parametric differential rotation law", Authors: F. Cipolletta, S. Filippi, C. Cherubini, J. A. Rueda, R. Ruffini;

- "Analysis of micro- fibers porosity on a rolling collector for several polymeric material's physical properties", Authors: F. Cipolletta, M. Lauricella, G. Pontrelli, S. Succi, D. Pisignano;

Submitted:

- "Effects of Orthogonal Rotating Electric Fields on Electrospinning Process", Authors: F. Cipolletta, M. Lauricella, G. Pontrelli, D. Pisignano, S. Succi, Phys. Rev. Applied.

Dichiara Simone

Position: Postdoc
Period covered: 09/2016-now

I Scientific Work

I'm A Postdoc at the "Instituto de Astronomia" of the Universidad Nacional Autónoma de México (UNAM). I'm currently analyzing the data collected by the high energy experiment called "High Altitude Water Cherenkov telescope" (HAWC) set inside the "Parque Nacional Pico de Orizaba" (Mexico). I'm involved in the multi-wavelength analysis of light curves of Blazars and the study of possible correlation between different parts the emission. This investigation is very important to constrain the emission model and the physics of behind the nature of these particular sources (to derive informations about the magnetic field, the electrons energy distribution, etc).

Moreover I'm involved in the search of Gamma-ray Bursts counterpart at very high energies (>TeV) and in the study of transient sources.

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

III a. Within ICRANet

III b. Outside ICRANet

I participate to the FACT collaboration meeting in Würzburg, from 28/08/2016 to 02/09/2016. I'm currently an external collaborator of the FACT group

I join the HAWC collaboration meeting in Puebla (Mexico) from 07/11/2016 to 09/11/2016

I attended the ASTERICS VO School in Madrid from 14/12/2015 – 18/12/2015

IV. Other

2016 List of Publication

Dichiara, S.; Guidorzi, C.; Amati, L.; Frontera, F.; Margutti, R., Astronomy & Astrophysics, 589, article id. A97, "A correlation between peak energy and Fourier power density spectrum slope in gamma–ray bursts"

Guidorzi, C.; Dichiara, S.; Amati, L; Astronomy & Astrophysics, 589, article id. A98, "Individual power density spectra of Swift gamma–ray bursts"

Frontera, F.; Amati, L.; Farinelli, R.; Dichiara, S.; Guidorzi, C.; Landi, R.; Titarchuk, L.; International Journal of Modern Physics D, 25, Issue 5, id. 1630014, "Possible physical explanation of the intrinsic Ep,i-"intensity" correlation commonly used to "standardize" GRBs"

Gendre, B.; Dereli, H.; Boer, M.; Amati, L.; Dichiara, S.; American Astronomical Society, AAS Meeting #227, id.442.02, "A sample gamma-ray bursts with low luminosity afterglow to statistically derive their properties"

Becerra Bayona Laura Marcela

Position: PhD student

Period covered: 2014-present

I Scientific Work

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

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

II Conferences and educational activities

II a Conferences and Other External Scientific Work

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

- The Second ICRANet César Lattes Meeting. Rio de Janeiro, Brasil. April 13rd-18,th 2015. "Angular Momentum Tranfer During the Hypercritical Accretion in Binary-Driven-Hypernova" L. Becerra, F. Cippoletta, F. Fryer, J. Rueda and R. Ruffini.
- Fourteenth Marcel Grossmann Meeting – MG14. Rome, Italy. July 12nd-18th, 2015:
    1. "Angular Momentum Tranfer Role in the Hypercritical Accretion of Binary-Driven-Hypernova" L. Becerra, F. Cippoletta, F. Fryer, J. Rueda and R. Ruffini.
    2. "Induced compression by angular momentum loss in fast rotating, magnetized Super-Chandraskehar white dwarfs" L. Becerra, E. Garcia-Berro, P. Loren-Aguilar and J. Rueda

- Supernovae, Hypernovae and Binary Driven Hypernovae. An Adriatic Workshop. Pescara, Italy. July 20-30,2016:
    1. "The spin evolution of fast rotating,magnetized super-Chandraskehar white dwarfs in the aftermath of white dwarfs mergers" L. Becerra, E. Garcia-Berro, P. Loren-Aguilar and J. Rueda.
    2. "On the induced gravitational collapse scenario of gamma-ray bursts associated with supernova". L.Becerra, C. L. Biando, C. Fryer, J.A. rueda, R.Ruffini.

- XV Latin American Regional IAU Meeting (LARIM). Cartagena, Colombia. October 3-7/2016. "Hypercritical Accretion in the Induced Gravitational Collapse" L.Becerra, C. L. Biando, C. Fryer, J.A. rueda, R.Ruffini.

2016 List of Publication

- On the induced gravitational collapse scenario of gamma-ray burst associated with supernovae, L. Becerra, C. L. Bianco, C. Fryer, J. A. Rueda and R. Ruffini, to be publish in ApJ. preprint: arXiv: 1606.02523

- Spin evolution of fast rotating magnetized super-Chandraskehar white dwarfs formed in white dwarf mergers. L. Becerra, P. Loren-Aguilar, E. García-Berro and J. A. Rueda. submitted to ApJ

Harutyunyan Vahagn

Position: **PhD**

Period covered: 2013-2016

I Scientific Work

Main Field: Extragalactic Astronomy

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 at 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-studded 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 As a Function of Galaxy Radio and Infrared Power: 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.

III b. Outside ICRANet

IV. Other

2016 List of Publication

1. M.T. Botticella et al., Supernova rates from the *SUDARE* VST-OmegaCam search II. Rates in a galaxy sample. Accepted for publication in *Astronomy & Astrophysics*
2. V. Harutyunyan et al., Supernova rates as a function of galaxy radio and infrared power 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

Supernovae, Hypernovae and Binary Driven Hypernovae, An Adriatic Workshop Pescara - June 20-30, 2016

Title: Plasma accretion onto The Kerr Black hole

2016 List of Publication

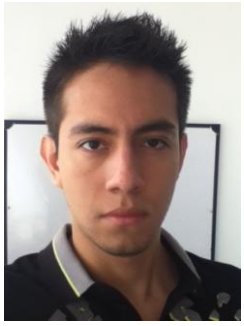
1. Magnetohydrodynamical Effects of The Neutral Plasma Accretion into a Kerr Black hole, in preparation Remo Ruffini, Christian Cherubini, Simonetta Filippi, Robert Jantzen, Rahim Moradi, Wang Yu, She-Sheng Xue

2. The Dynamics of Multi-Component Charged Fluids in the Presence of A Black Hole, in preparation. Remo Ruffini, Sorush Shakeri, Rahim Moradi, Wang Yu, She-Sheng Xue

3. GRB 090510: a genuine short-GRB from a binary neutron star coalescing into a Kerr-Newman black hole, Remo Ruffini et al.
Astrophys.J. 831 (2016) no.2, 178 (2016-11-04)

4. On the universal late X-ray emission of binary-driven hypernovae and its possible collimation. Remo Ruffini, et al.to be appeared in APJ

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. IBSN 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 Scienti_que de Cargese (IESC) Cargese - France, Sept. 21st- 27th, 2014.
- J. F. Rodriguez, J. A. Rueda and R. Ruffini, A Simple Approach to GW150914. Fourth Bego Rencontres IRAP Ph.D. Erasmus Mundus school May 30th -Villa Ratti, Nice, June 3rd, 2016
- J. F. Rodriguez, J. A. Rueda and R. Ruffini, A Simple Approach to GW150914. Supernovae, Hypernovae and Binary Driven Hypernovae An Adriatic Workshop Pescara - June 20-30, 2016

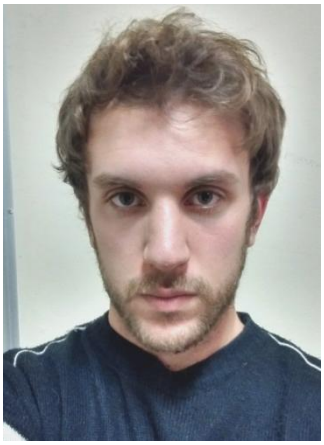
2016 List of Publication

- J. F. Rodriguez, J. A. Rueda, R. Ruffini, What can we really infer from GW 150914?arXiv:1605.04767

- J. F. Rodriguez, J. A. Rueda, R. Ruffini, What can we really infer from GW 150914? (II), arXiv:1605.07609

- R. Ruffini, J. F. Rodriguez, M. Muccino, J. A. Rueda, Y. Aimuratov, U. Barres de Almeida, L. Becerra, C. L. Bianco, C. Cherubini, S. Filippi, D. Gizzi, M. Kovacevic, R. Moradi, F. G. Oliveira, G. B. Pisani, Y. Wang, On the rate and on the gravitational wave emission of short and long GRBs, arXiv:1602.03545 (submitted to APJ).

Melon Fuksman, Julio David



Position: PhD student

Period covered: 2015-2018

I Scientific Work

Numerical hydrodynamics, focused on relativistic plasma physics applied to GRBs. Formerly Quantum Field Theory, applied to the study of Casimir Effect.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

2016 - Speaker at *"Supernovae, Hypernovae and Binary Driven hypernovae", an Adriatic Meeting*, International Center for Relativistic Astrophysics, ICRANet headquarters, Pescara, Italy. Title of the talk: "Numerical methods for relativistic plasma physics."

2016 - Attended at *Forth Bego Rencontres (PhD school)*, International Center for Relativistic Astrophysics, Villa Ratti, Nice, France.

2015 - Attended at *100º National Physics Reunion*, Asociación Física Argentina, Merlo, Argentina. Poster presented: "Effective Theories for the Casimir Effect."

2015 - Attended at *Workshop on Astrophysics and Relativity: Astro-GR 2015*, ICTP South American Institute for Fundamental Research, Sao Paulo, Brazil.

2015 - Attended at *School on Gravitational Waves: from data to theory and back*, ICTP South American Institute for Fundamental Research, Sao Paulo, Brazil.

2014 - Attended at *99º National Physics Reunion*, Asociación Física Argentina, Tandil, Argentina. Poster presented: "Characterization of a scintillation detector system and its implementation in the study of the flux of secondary cosmic rays."

III. Service activities

III b. Outside ICRANet

2015 - Teaching assistant, Instituto Balseiro, Argentina. Subject: Quantum Mechanics I.

2011-2012 - Undergraduate teaching assistant, Universidad Nacional de Mar del Plata, Argentina. Subjects: Physics I, Mathematical Analysis I, Linear Algebra II.

Primorac Daria

Position: IRAP PhD student
Period covered: January 2016 - December 2018

I Scientific Work

Gamma-Ray Bursts: Data Analysis and Theory

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- *Thermoelectric workshop on new thermoelectric materials, 28.09 - 2.10.2013, Split, Croatia http://thermoelectrics2013.ifs.hr/program/*
- *The 4th Bego Recontres - IRAP Ph.D Erasmus Mundus school, 30.5.2016 - 3.6.2016 , Nice, France*
- *Supernovae, Hypernovae and Binary Driven Hypernovae, 20.6.2016 - 30.6.2016, Pescara, Italy*

2016 List of Publication

IRAP Ph. D. Erasmus Mundus Students

Liccardo Vincenzo

Position: Post-doc at ITA-Instituto Tecnologico de Aeronautica, Sao Jose dos Campos, SP, Brasil.
Period covered: November 2014 – November 2017

I Scientific Work

My activity concerns the development and tests of electromechanical transducers for the Brazilian gravitational wave detector "Mario Schenberg", under supervision of Prof. Odylio D. Aguiar. The detector, which is being built by the GRAVITON group of INPE (National Institute for Space Research), basically consists of a spherical resonant mass with nine parametric transducers, of reentrant cavity type, which monitor its fundamental modes of vibration. The detector resonant frequency is 3.2 kHz with a bandwidth of 400 Hz and it is located at the University of Sao Paulo. When coupled to the antenna, the transducer-sphere system will work as a mass-spring system with three modes, where the first will be constituted by the antenna effective mass, the second will be constituted by the mechanical structure of the transducer, and the third one will be constituted by a membrane that will close the transducer microwave cavity and modulate it around 3.2 kHz

The main tasks will be the optimization, test and assembling of a new parametric transduction system, based on superconducting reentrant cavities with high electrical Q-factor (Q). High Q values will allow us to reach the quantum limit of detector sensitivity of $\sqcup\ 10^{22}\ Hz^{-1/2}$ in the near future, making it possible to search for gravitational waves around 3.2 kHz.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- SPIE Astronomical Telescopes + Instrumentation 2016 Conference, June 26 - July 1, 2016, Edinburgh (Scotland);

- XXXIII Encontro de Fsica 2016 - Sociedade Brasileira de Fisica, September 3-7, 2016, Natal (Brazil);

- 7th International Workshop on Astronomy and Relativistic Astrophysics - IWARA 2016, October 9-13, 2016, Gramado (Brazil);

II b Work With Students

Type: Iniciação Científica

Student: Manoel Gumes,

Title: "Astrofísica nuclear: origem dos elementos e produção de elementos pesados",

Agency: CAPES

Period: May 2016 – May 2017

II c Diploma thesis supervision

Type: Thesis Coorientation

Student: Ivana Cunha

Title: "Noise analysis of the Schenberg detector",

Start Period: October 2016

III. Service activities

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2016 List of Publication

- Development of superconducting Klystron cavity for the Ma- rio Schenberg gravitational wave detector, V. Liccardo, O. D. Aguiar, E. K. de Franca. [Proceedings of the MG14 Meeting on General Relativity, Singapore: World Scientific], (2016); (arXiv:1511.05902)

- The LAUE project: latest developments, V. Liccardo, E. Virgilli, F. Frontera, P. Rosati. [Journal of Physics: Conference Series 706 (2016) 052037], (2016); doi:10.1088/1742-6596/706/5/052037

- Study of the effect of NbN on microwave Niobium cavities for Gravitational Wave Detectors, V. Liccardo, E. K. Franca, O. D. Aguiar, R. M. Oliveira, K. L. Ribeiro, and M. M. N. F. Silva. [Journal of Instrumentation], Vol. 11, No. 07 (2016); doi:10.1088/1748-0221/11/07/P07004

- Optimization of high sensitivity parametric transducers for the Gravitational Wave Detector "Mario Schenberg", V. Liccardo, E. C. Ferreira, O. D. Aguiar and R. M. Oliveira [Society of Photo-Optical Instrumentation Engineers SPIE Conference Series], Vol. SPIE 9912, (2016); doi:10.1117/12.2235867

- Simulation of a Laue lens with bent Ge(111) crystals, E. Virgilli, V. Valsan, V. Liccardo, F. Frontera, E. Caroli, J. B. Stephen. [Manuscript submitted for publication to JATIS], (2016);

Bardho Onelda

Position: PhD Student

Period covered: 01/02/2013 – 31/01/2016

I Scientific Work

GRBs are flashes of gamma-rays coming from cosmos. They are one of the most mysterious events we have been able to observe since their discovery.
GRBs are classified into two groups: long/soft GRBs and short/hard GRBs. Their emission mechanism consists of two phases: prompt emission and afterglow emission.
The launch of the Swift satellite opened a New Era in the GRBs research. Swift is able to provide accurate position for more GRBs than previous missions, thanks to its fast capabilities of slewing. Furthermore the Swift shows that GRBs have a canonical behaviour for the X-ray afterglow light curves.
The data analysis process remains the key point of GRBs studies. I present a detailed study of the peculiar GRB 141221A at different wavelengths. GRB 141221A shows an unusual steep rise in the optical light curve of the afterglow. The broad band spectral energy distribution, taken near the maximum of the optical emission, presents either a thermal component or a behaviour break. This burst displays unusual feature in the optical band, whereas the X-ray data is more common. GRB 141221A is one of the challenging bursts that excludes a stellar wind from the progenitor of the GRBs.
A clustering in the X-ray afterglow light curves was observed before the launch of the Swift satellite. This feature has been debated after the launch of the Swift. We have built a sample which consists of 254 GRBs that shows a scattering of the data for the flux distribution at one day. This distribution was investigated with a normalization of light curves at redshift one.
We have investigated the problem into three different directions: 1. Instrumental Problems, 2. Data Calibration Problems, 3. Absence of clustering.
The investigation of the instrumental problems is related to the observation problems of the Swift satellite along the year, since we observe some seasonal effects during solstices and equinoxes. The earth limb angle is one evidence that there are not instrumental problems rather than data processing problems. The data shows that the admission limit angle is overtaken.
The data calibration process is an interesting issue which might influence the results of the study. I provide different evidences towards problems that can induce serious flows in the results of data analysis process, by comparing the manual and the automatic data analysis found from Swift - XRT repository. I suggest the cases where the manual analysis should be performed and the cases where the automatic analysis does not affect the results.
The last possibility of the non-existence of this clustering should be a selection effect. This is because before the launch of the Swift satellite, the possibility of observing the X-ray afterglow was extremely low. However it is extremely difficult to find a bias in this analysis that was performed using the data from two different satellites.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

1. The National Meeting on High Energy, 11-12 February 2013, CNES, Paris, France
2. IVth School of Astroparticle Physics - Gravitational Waves, OHP, Saint Michel l'Observatoire - May 27th - juin 1st, 2013.
3. IVth School of Astroparticle Physics - Gravitational Waves, OHP, Saint Michel l'Observatoire - May 27th - juin 1st, 2013.
4. Eleventh NEON observing school, La Palma – Canary Islands, 14-27 July 2013
5. LSC – Virgo Collaboration meeting, Nice – France, March 17-21, 2014
6. The 40th COSPAR Scientific Assembly, Moscow – Russia, August 2- 10, 2014
7. International Workshop on LHC, Astrophysics, Medical and Environmental Physics, Shkodra (Albania), October 6-8, 2014
8. Swift: 10 Years of discovery, Roma – Italy, 2 – 5 December 2014
9. Fourteenth Marcel Grossmann Meeting - MG14, 12 - 18 July 2015, Roma, Italy

II b Work With Students

II c Diploma thesis supervision

Michel BOER (ARTEMIS/OCA -Nice)

II d Other Teaching Duties

II e. Work With Postdocs

III. Service activities

III a. Within ICRANet

1. Second Bego Scientific Rencontre Meeting, Nice-France, May 16-31, 2013
2. IRAP Ph.D. Erasmus Mundus school, Nice – France, September 02 - 20, 2013
3. Winter school, IRAP Ph.D Erasmus Mundus Nice – France, February 23 – March 2, 2014
4. Supernovae, Gamma-ray Bursts and Induce gravitational collapse , IRAP PhD and Erasmus Mundus Workshop, Les Houches – France, May 11-16, 2014
5. Third Bego Rencontres, IRAP Ph.D. Erasmus Mundus school, Nice-France, September 8-19, 2014

III b. Outside ICRANet

Seminar

Invited by Etelman Observatory-Saint Thomas and University of the Virgin Islands, September 2015, Virgin Islands, USA

IV. Other

Mobility 6 months (02 February - 31 July 2015) in Bologna/Ferrara. I have been working in the GRB grou in Bologna under the supervision of my Co-supervisor, Lorenzo AMATI and collaborating with the group in Ferrara.

V. List of Publication

Proceeding

O. Bardho, M. Boer, B. Gendre, "10 Years of XRT light curves: a general view of the X-ray afterglow", in proceedings of "Swift: 10 years of Discovery", POS(SWIFT 10) 062

Journal

O. Bardho, B. Gendre, A. Rossi et.al; "GRB 141221A: gone is the wind", MNRAS 459, 508-516. March 2016

Ludwig Hendrik

Position: PhD student

Period covered: 01.01.2016 – 29.02.2016

I Scientific Work

Thesis defense 29.2.2016

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

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2016 List of Publication

Gómez Díaz Luis Gabriel

Position: Ph.D student

Period covered: 2013-2016

I Scientific Work

Structure Formation and Inos:

It has been recently shown [Ruffini, Arguelles, Rueda, 2015] that a self-gravitating system of massive keV fermions in thermodynamic equilibrium successfully describes the dark matter (DM) halos from dwarf to big spiral galaxies, and predicts the existence of a denser quantum core towards the center of the configuration. This quantum feature related to its fermionic nature may lead to interesting effects observable in our local Universe. Starting from that, I am working in different scenarios in which the fermionic DM effects can be tested by upcoming surveys. First, I am re-examining the assumptions in which the phase-space density (PSD) has been used to constraint the DM particle mass by both theory and simulations. As a first result, I show that the quantum nature increases the PSD modifying the bounds for the fermionic DM particle mass. Second, I am analyzing the role of these particles in the structure formation specifically at small scales where the CDM cosmological model suffers some problems indicating significant discrepancies with astrophysical observations. Finally, I am studying the lensing properties of these novel DM configurations in Milky Way-like galaxies and compare and contrast them with the results obtained for phenomenological DM density profiles such as the Navarro-Frenk and White one. This latter work has been done during my mobility period at the University of Bremen-Germany. On the other hand, the intrinsic orbital period decay of relativistic binary pulsars (with characteristic orbital period 0.1 days) are completely accounted for gravitational waves emission with an unprecedented precision. We show however in a current work that, for periods larger that 20 days, the orbital period decay can be described instead by dynamical friction of dark matter (DM), when the pulsar and its companion interact with their respective wakes such that a change in its orbital motion is produced. The scale orbital period at which this effect can be accounted, depends sensibly on the DM density profile.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- *IRAP Ph.D. Erasmus Mundus school. 2-20 September, 2013. Nice (France).*
- *IRAP-PhD Erasmus Mundus School, "Nice Winter School": 23 February - 2 March 2014. Nice (France).*
- *IRAP Ph.D. Erasmus Mundus Workshop: Supernovae, Gamma-ray bursts and the induced gravitational collapse, May 11-16, 2014 - Les Houches (France).*

- *IRAP Ph.D. Erasmus Mundus school "Third Bego Rencontres" 8-19 September 2014- Nice (France).*

- *1st Scientific ICRANet Meeting in Armenia: Black Holes: the largest energy sources in the Universe. 30 June - 4 July 2014 – Yerevan (Armenia).*

- *Ecole Internationale Daniel Chalonge Workshop CIAS Meudon 2014: From Large to small scale in agreement with observations: CMB, WDM, Galaxies, Black holes, Neutrinos and sterile Neutrinos. 4-6 June 2014- Observatoire de Paris, Château de Meudon CIAS (France).*

- *The Second ICRANet César Lattes Meeting: Niterói - Rio De Janeiro, April 13-18 - João Pessoa, April 21 - Recife - Fortaleza, April 22, 2015 (Brazil).*

- *Fourteenth Marcel Grossmann Meeting - MG14, University of Rome "La Sapienza" - Rome, July 12-18, 2015 (Italy).*

- *Centenary Celebration of General Relativity Theory: Andean School on Gravity and Cosmology. 17-21 November 2015, Bogotá (Colombia).*

- *The 1st Colombia-ICRANet Julio Garavito Armero Meeting. 23-25 November- Bucaramanga, 26-27 November 2015 - Bogotá (Colombia).*

- *From theory to applications: Celebrating a century of gravitational lensing. University of Leiden - Leiden, the Netherlands. July 11-15, 2016.*

- *Fourth Bego Rencontres IRAP Ph.D. Erasmus Mundus school. Villa Ratti,- Nice, France. May 30th - June 3rd, 2016*

- *Supernovae, Hypernovae and Binary Driven Hypernovae An Adriatic Workshop*
  International Center for Relativistic Astrophysics Network-ICRANet . Pescara - June 20-30, 2016.

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

Mobility period: Center of Applied Space technology and microgravity- ZARM, Bremen University. 3 June - 28 September 2015. 30 March - 30 May, 2016.

IV. Other

2016 List of Publication

L. Gabriel Gómez, C. R. Arguelles, Volker Perlick, J. A. Rueda & R. Ruffini. Strong lensing by fermionic dark matter in galaxies. Submitted to Physical Review D.

Kovačević Miloš

Position: Erasmus Mundus Joint Doctorate student
Period covered: September 2013 – August 2016

I Scientific Work

Application and analysis of the Induced Gravitational Collapse in some GRBs-SNe

II Conferences and educational activities

- Erasmus Mundus School, Nice, France 02-20 September 2013
- Erasmus Mundus School, Nice, France 23 February - 02 March 2014
- School of Physics - Les Houches, France 10-16 May 2014
- 1st Scientific ICRANet Meeting in Armenia, Yerevan, Armenia 30 June – 4 July 2014
- Erasmus Mundus School, Nice, France 08-19 September 2014
- Fourteenth Marcel Grossmann Meeting (MG14), Rome, Italy 12-18 July, 2015
- 14th Italian-Korean Symposium on Relativistic Astrophysics, Pescara, Italy 20-24 July, 2015
- Fourth Bego Rencontres, June 2016, Nice, France
- An Adriatic Workshop, Pescara, Italy; 20-30 June 2016

List of Publication

- Ruffini, R.; Muccino, M.; Bianco, C. L.; Enderli, M.; Izzo, L.; Kovacevic, M.; Penacchioni, 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.; Wang, Y.; Enderli, M.; Kovacevic, M.; Bianco, C. L.; Muccino, M.; Penacchioni, 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.; Oliveira, F. G.; Rueda, J. A.; Bianco, C. L.; Enderli, M.; Penacchioni, A. V.; Pisani, G. B.; Wang, Y., "GRB 140619B: a short GRB from a binary neutron star merger leading to black hole formation", 2015, ApJ, 808, 190.

Lisakov Sergey

Position: PhD student
Period covered: Sept 2013 – Nov 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

June 2016
IV Bego Rencontre EMJD IRAP, Nice, France.
Oral talk «Core-collapse supernovae and their progenitors»

August 2015
IAU XXIX General Assembly, Honolulu, USA. Poster presentation «A study of low luminosity Type II-P supernova 2008bk»

July 2015
Conference XIV Marcel Grossmann Meeting — MG14, Rome, Italy. Poster presentation «A study of low luminosity Type II-P supernova 2008bk»

June 2014
Conference «New windows on massive stars: asteroseismology, interferometry and spectropolarimetry», Geneva, Swiss

August 2014
«Supernovae in the local Universe: celebrating 10,000 days of supernova 1987a», Coffs-Harbour, Australia

September 2014
Erasmus Mundus Joint Doctorate School, Les Houches, France

May 2014
Erasmus Mundus Joint Doctorate School, Nice, France

September 2013
Erasmus Mundus Joint Doctorate School, Nice, France

May 2012
Public conference «Heading to the Space», invited speaker, Moscow, Russia

IV. Other

2016 List of Publication

1. Pruzhinskaya M. V. & Lisakov S. M., «Supernovae stars — the base of the observational cosmology», Journal of Astronomical History and Heritage, 19(2), 203-215.

2. Lisakov S. M. et al., «A study of low luminosity Type II-P supernova 2008bk», accepted in MNRAS

Maiolino Tais

Position: Ph.D Student

Period covered: 2013-2017

I Scientific Work

Exploring outflows as origin of red-skewed iron lines in compact objects

II Conferences and educational activities

II Conferences and Other External Scientific Work

- Journées PNHE 2016, *30th-31st March 2016, Paris (France)*
- *Physics of the Universe in X-rays, CNRS, 23rd-28th May 2016, Observatoire de Haute-Provence (OHP) (France)*

2017 List of Publication

No publications

Sridhar Srivatsan

Position: PhD student (Astrophysics)
Period covered: Nov 2013 – Dec 2016

I Scientific Work

Working on the statistical analysis of galaxy clusters, in particular to develop optimised methods for the analysis of the distribution of clusters in the Euclid Survey. Analysis of mass proxies such as richness and cosmological constraints from mass function and cluster counts are some of the other topics studied. Data analysis of large data sets, error propagation, are some of the many tools used.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

CONFERENCE TALKS GIVEN:

Paris, France, Euclid OU-LE3 meeting
"The evolution of the two-point correlation function from simulated cluster catalogues"

Barcelonnette, France, JDPN meeting
"Galaxy clusters and their properties", ***invited talk***

Bologna, Italy, Euclid join SWG-OULE3 meeting
"Statistical analysis of galaxy clusters"

Mykonos, Greece, Hot spots in the XMM sky: Cosmology from X-ray to Radio "Evolution of the real-space correlation function from next generation cluster surveys"

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

2016 List of Publication

MNRAS:

"Galaxy and Mass Assembly (GAMA): Projected Galaxy Clustering". http://mnras.oxfordjournals.org/content/454/2/2120.full.pdf
arXiV link: http://arxiv.org/pdf/1509.02159v1.pdf

Astronomy & Astrophysics:

"Evolution of the real-space correlation function from next generation cluster surveys", Srivatsan Sridhar, S.Maurogordato, C.Benoist, A.Cappi and F.Marulli, et al., 2016 (Accepted for publication in Astronomy & Astrophysics).

Stahl Clément

Position: Erasmus Mundus PhD student

Period covered: 2013-present

I Scientific Work

On early and late phases of acceleration of the expansion of the Universe

II Conferences and educational activities

II a Conferences and Other External Scientific Work

1) 25 May 2016: Crafoord Prize Symposium: Rotating black holes and their astrophysical consequences, Stockholm
2) April-May 2016**:** 4th Bego rencontres, IRAP Ph.D. Erasmus Mundus school, Nice
3) June 2016: Supernovae, Hypernovae and Binary Driven Hypernovae, An Adriatic Workshop, Pescara

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.2016 list of Publication :

C. Stahl, Inhomogeneous matter distribution and supernovae, Int. J. Mod. Phys. D **25**, 1650066, http://www.worldscientific.com/doi/abs/10.1142/S0218271816500668 .

C. Stahl, E. Strobel, S-S. Xue, Fermionic current and Schwinger e#ect in de Sitter spacetime, Phys. Rev. D **93** (2016) 2, 025004, http://arxiv.org/abs/1507.01686

C. Stahl, S-S. Xue, Schwinger effect, backreaction and magnetogenesis in de Sitter spacetime, Phys.Lett. B **760** (2016) 288-292, https://arxiv.org/abs/1603.07166

C. Stahl, E. Strobel, S-S. Xue, Pair creation in the early universe, http://arxiv.org/abs/1602.09090 (proceeding of MG14)

E. Bavarsad, C. Stahl S.-S. Xue, Scalar current of created pairs by Schwinger mechanism in de Sitter spacetime, http://arxiv.org/abs/1602.06556 , accepted to PRD

Yang Xiaofeng

Position: EMJD
Period covered: 2013-2016

I Scientific Work

I used different cosmological probes to constrain cosmology, such as the foundations of modern cosmology and the evolution of universe. A cosmological preferred direction was reported from the type Ia supernovae (SNe Ia) data in recent years. Most gamma-ray bursts (GRBs) 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. I am working on using GRBs and other probes for investigating the evolution of universe.

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, June 30, 2016, Supernovae, Hypernovae and Binary Driven Hypernovae, An Adriatic Workshop, Pescara June 20-30, ICRANet, Italy

Guilder, September 30, 2016, La Notte Europea dei Ricercatori 2016

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

2016 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

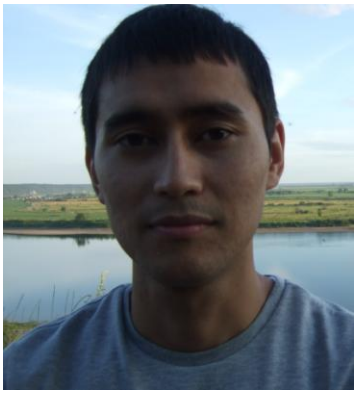
Testing the cosmological principle of isotropy: Gamma-ray bursts

Xiaofeng Yang, et al, will submit to MNRAS

Constraint on cosmological parameters: 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

- participation and oral presentation "X-ray Flares and Thermal Component"
  An Adriatic Workshop "SNe, Hypernovae and BDHNe", 2016 June 20th-30th, Pescara, Italy
  http://icranet.org/am/
- participation on "Summer School on Cosmology"
  International Centre for Theoretical Physics, 2016 June 6th-17th, Trieste, Italy
  http://indico.ictp.it/event/7626/overview
- participation on "Forth Bego Rencontres"
  IRAP PhD Erasmus Mundus School, 2016 May 30th-June 3rd, Nice, France
  http://icranet.org/index.php?option=com_content&task=view&id=986
- oral presentation "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
- participation and oral presentation "GRB 081024B Analysis and Redshift Estimation"
  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#
- participation, proceeding and oral presentation "Analysis of the GRB 081024B"
  Marcel Grossmann Meeting XIV, 2015 July 12th-18th, Rome, Italy
  parallel session GB5-A: http://www.icra.it/mg/mg14/parallel_sessions.htm
- participation on Weekly ICRANet seminars of invited Professors, March 2015
  http://www.icra.it/seminari/Welcome.htm
- participation on "1st ICRANet Lecture Series for PhD students" organized by L. Izzo

II b Work With Students

- LAT, LLE data reduction and analysis, October 2016

  with EMJD PhD student M. Kovacevic

- XRT data reduction and analysis, March-September 2016

  with IRAP PhD students Y. Wang, R. Moradi, M. Peresano, S. Shakeri

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, XSPEC

  with ICRANet Postdoc M. Muccino, January-December 2016

- data reduction and analysis with HEASOFT

  with ICRANet Postdoc L. Izzo, November-December 2015

- fireshell model and analysis procedure for GRBs with RMFIT, XSPEC

  with ICRANet PostDoc M. Muccino, February-December 2015

III. Service activities

III a. Within ICRANet
None

III b. Outside ICRANet
None

IV. Other

2016 List of Publication

- Abishev, M.; **Aimuratov, Y.**; Aldabergenov, Y.; Beissen, N.; Zhami, B.; Takibayeva, M. Some astrophysical effects of nonlinear vacuum electrodynamics in the magnetosphere of a pulsar // Astroparticle Physics, Vol. 73, Pages: 8-13, 2016

2015 List of Publication

- Ruffini, R.; **Aimuratov, Y.**; Belinski, V.; Bianco, C. L.; Enderli, M.; Izzo, L.; Kovacevic, M.; Mathews, G. J.; Moradi, R.; Muccino, M.; Penacchioni, A. V.; Pisani, G. B.; Rueda, J. A.; Vereshchagin, G. V.; Wang, Y.; Xue, S.-S. Cosmic matrix in the jubilee of relativistic astrophysics // AIP Conference Proceedings, Volume 1693, Issue 1, id.020001, 2015

- 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, Vol. 30, Issue: 28-29, id.1545023-372, 2015

- Kondratyeva, L.; Rspayev, F.; **Aimuratov**, **Y.** New results on spectral and photometric variability of V806 Cassiopeiae // Information Bulletin on Variable Stars, Issue 6141, 1K, 2015

2014 List of Publication

- Kondratyeva, L.; Rspayev, F.; **Aimuratov**, **Y.** Ionization Structure of Nebula NGC 6857 // Astronomy Letters, Vol. 40, Issue 11, Pages: 704-712, 2014

- Rspayev, F.; Kondratyeva, L.; **Aimuratov**, **Y.** CH Cygni: new brightening in 2014 // Information Bulletin on Variable Stars, Issue 6117, 1R, 2014

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

May 30 – June 3, 2016- Fourth Bego Rencontres-IRAP Ph.D. Erasmus Mundus school, Nice, France.

June 27 – July 1, 2016- "Active Galactic Nuclei: what's in a name?" Workshop, Garching, Germany.

2016 List of Publication

Chang, Y.-L.; Arsioli, B.; Giommi, P.; and Padovani, P. A&A accepted.

Arsioli, B and Chang, Y.-L. A&A accepted

Padovani, P.; Giommi, P.; Resconi, E.; Arsioli, B.; Chang, Y.-L. , 2016, MNRAS 457, 3582

Delgado-Correal Camilo

Position: Erasmus Mundus PhD Student

Period covered: 2015-2017

I Scientific Work

Propierties of low luminosities high redshift galaxies found in lensed fields by galaxy clusters

II Conferences and educational activities

II a Conferences and Other External Scientific Work

- *7th Young Research Meeting. Torino-Italy, October 24 to 26, 2016.*
- *XV LARIM 2016 (Latin American Regional IAU). Cartagena-Colombia, October 3 to 7, 2016.*
- *A Century of Gravitational Lensing: from Theory to Application. Leiden-Netherlands, July 11-15, 2016.*
- *4th Bego Rencontres IRAP Ph.D. Erasmus Mundus school. Nice-France, May 30 to June 2, 2016.*

2016 List of Publication

G. B. Caminha, C. Grillo, P. Rosati, I. Balestra, A. Mercurio, E. Vanzella, A. Biviano, K. I. Caputi, **C. Delgado-Correal**, W. Karman, M. Lombardi, M. Meneghetti, B. Sartoris, P. Tozz, "A refined mass distribution of the cluster MACS J0416.1−2403 from a new large set of spectroscopic multiply lensed sources", submitted to A&A, (12 Jul 2016) https://arxiv.org/abs/1607.03462

Delgado-Correal C., Rosati P., Grillo C., Mercurio A., Balestra I., Nonino M., Vanzella E. "Identification of low luminosity high redshift galaxies using galaxy clusters as cosmic telescopes", [Submitted]Proceedings of the Fourteenth Marcel Grossman Meeting on General Relativity. World Scientific, 2016.

Efremov (Jefremov) Pavel

Position: PhD student
Period covered: 2016 A.D.

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, Bremen, Germany (January, 13th)
2) RTG "Models of Gravity", Colloquium, Bielefeld, Germany (February, 17th)
3) DPG Spring Meeting, Hamburg Germany (February, 29th – March, 4th). Talk with presentation.
4) RTG "Models of Gravity", Colloquium, Oldenburg, Germany (April, 13th). Talk with presentation.
5) RTG "Models of Gravity", Spring Workshop, Bielefeld, Germany (April, 27th–28th)
6) 11. Kosmologietag, Bielefeld, Germany (April, 27th–28th)
7) RTG "Models of Gravity", Colloquium, Hannover, Germany (May, 11th)
8) 4th Bego Recontres, Nice, France (May, 30th – June, 3rd). Talk with presentation.
9) RTG "Models of Gravity", Colloquium, Bremen, Germany (July, 6th)
10) International "Enrico Fermi" School on Physics: Foundations of quantum theory. Varenna, Italy (July, 8th – 13th)
11) International Astronomical Union, Symposium 324. Ljubljana, Slovenia (September, 12th – 18th). Poster presentation.
12) RTG "Models of Gravity", Summer School: "Relativistic accretion: theoretical models and their application to observations". Bremen, Germany (September, 26th – 30th).
13) RTG "Models of Gravity", Renewal Conference, Oldenburg (October, 4th – 7th). Poster Presentation.

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

2016 List of Publication

1) Tsupko, O. Yu., Bisnovatyi-Kogan, G. S., Jefremov, P. I. Parameters of innermost stable circular orbits of spinning test particles: Numerical and analytical calculations. *Grav. & Cosm.*, 22 (138–147)

2) Jefremov, P. I., Perlick, V. Circular motion in NUT space-time. Accepted to: *Class. & Quant. Grav.*

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 years we constructed the paradigm of "sponge" model which includes the influence of ejecta fragmentation on the form of GRB afterglow lightcurve. Therefore we developed a numerical code which capable to track the evolution of non-thermal particles and non-thermal radiation processes producing band dependant light curves.

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
- 14th Marcel Grossmann Meeting, Rome, Italy, July 12-18, 2015
- 6th Les Houches School in Numerical Physics - International School of Computational Astrophysics, Les Houches, France, May 16-27, 2016
- 4th Bego Rencontres - IRAP Ph.D. Erasmus Mundus school, Nice, France, May 30 - June 3, 2016
- Supernovae, Hypernovae and Binary Driven Hypernovae - An Adriatic Workshop, Pescara, Italy, June 20-30, 2016

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 14th Marcel Grossmann Meeting, Rome, Italy, July 12-18, 2015 with the title: ""Sponge Model" As The Hydrodynamical Background For GRB Afterglow Phase"
- Talk at 4th Bego Rencontres, Nice, France, May 30 - June 3, 2016 with the title: "Numerical kinetic equation solver and astrophysical perspectives"

- Talk at Supernovae, Hypernovae and Binary Driven Hypernovae - An Adriatic Workshop, Pescara, Italy, June 20-30, 2016 with the title: “Numerical kinetic equation solver and astrophysical perspectives”

III b. Outside ICRANet

- Poster at 6th Les Houches School in Numerical Physics, Les Houches, France, May 16-27, 2016 with the title: “Numerical kinetic equation solver and astrophysical perspectives”

IV. Other

2016 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

- *Supernovae, Hypernovae and Binary Driven Hypernovae, An Adriatic Workshop (Pescara, June 20-30,2016)*
- *Forth Bego Rencontres, IRAP Ph.D. Erasmus Mundus school (Nice, September 8-19, 2016)*
- *6th Les Houches school in numerical physics, International School of Computational Astrophysics (Les Houches, May 16-27, 2016)*
- *Astrophysical Probes of Fundamental Physics, A PhD School at University of Ferrara (Ferrara, September 7-11, 2015)*
- *14th Italian-Korean Symposium on Relativistic Astrophysics (Pescara, July 20-24, 2015)*
- *14th Marcel Grossmann Meeting (Rome, July 12-18, 2015)*
- *2nd César Lattes Meeting (Rio de Janeiro, April 13-22, 2015)*
- *Third Bego Rencontres, IRAP Ph.D. Erasmus Mundus school (Nice, September 8-19, 2014)*

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

III a. Within ICRANet

III b. Outside ICRANet

IV. Other

2016 List of Publication

Martinez Aviles Gerardo

Position: PhD student,

Observatoire de la cote d'azur, Nice, France

Period covered: September 2014 – present

I Scientific Work

During the second year of my PhD, under the supervision of Dr. Chiara Ferrari (Observatoire de la côte d'azur) I have almost completed the analysis of radio data using the Australian Telescope Compact Array (ATCA) of seven galaxy clusters, the largest gravitationally bound structures in the Universe. The focus of this project is the search for understanding the nature of Mpc-scale diffuse radio sources, coined Radio Halos. The work completed during this second year includes the acceptance of a paper as first author in the journal Astronomy & Astrophysics: "ATCA observations of the MACS-Planck Radio Halo Cluster Project - I. New detection of a radio halo in PLCK G285.0-23.7"*, Martinez-Aviles, Ferrari et al.* In press. In the paper we report the discovery of a Giant Radio Halo in a massive galaxy cluster, located at redshift z=0.39. We are now preparing a second paper "ATCA observations of the MACS-Planck Radio Halo Cluster Project – II. Radio observations of intermediate redshift ATCA cluster sample". *Martinez-Aviles, Johnston-Hollit et. al.* In prep. In this second paper we present the results of the observations of a sample of 7 intermediate redshift (z=0.3 – 0.44) massive galaxy clusters. The project to the third year is to finish the analysis of the complete ATCA+ GMRT observations of 32 galaxy clusters with the scope of better understand the mechanisms of re-acceleration of cosmic rays in the intra cluster medium, and it's relation with magnetic fields.

As part of the mobility opportunities privided by the International Relativistic Astrophysics PhD (IRAP) programme, I spent 5 months (February – June 2016) in the INAF-Osservatorio di Radioastronomia in Bologna, Italy. To work with a group of expert theoreticians and observers in the field. I also attended the prestigious Vatican Observatory Summer School VOSS 2016, to widen my scientific interests and extend my academic contacts.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

June 2016 Vatican Observatory Summer School, Castel Gandolfo, Italy

February-May 2016 Research visit in Istituto di Radioastronomia, Bologna, Italy

December 2015 Journées Nationales PNCG, Nice, France

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 3rd LOFAR Data processing school, Dwingeloo, Netherlands

III. Service activities

IV. Other

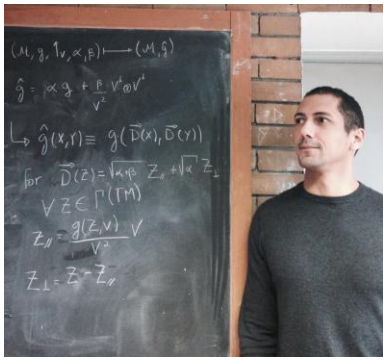
2016 List of Publication

- *ATCA observations of the MACS-Planck Radio Halo Cluster Project - I. New detection of a radio halo in PLCK G285.0-23.7.* G. Martinez Aviles, C. Ferrari, M. Johnston-Hollit et al. Astronomy & Astrophysics 2016; doi:10.1051/0004-6361/201628788

- *"Grandeur in this view of life": N-body simulation models of the Galactic habitable zone* B.Vukotic; D.Steinhauser; G.Martinez-Aviles et al. Monthly Notices of the Royal Astronomical Society 2016; doi: 10.1093/mnras/stw829

CAPES

Guimarães Carvalho, Gabriel



Position: Ph.D Student (CAPES-ICRANet Program)
Period covered: February 2014 – January 2017

I Scientific Work

Mathematical aspects of general relativity and mathematical physics.

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;

- Les Houches, May of 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

See section IV below.

II c Diploma thesis supervision

II d Other Teaching Duties

II e. Work With Postdocs

See section IV below.

Iç. **Other 2016 List of Publication**

-"On the disformal invariance of the Dirac equation" (Class. Quantum. Grav. 32, 185016) , joint work with Eduardo Bittencourt and Iarley Pereira.

-“Extended disformal approach in the scenario of rainbow gravity” (Physical Review D 93, 044005) , joint work with Eduardo Bittencourt and Iarley Pereira.

-“Scalar field self-force effects on a particle orbiting a Reissner-Nordström black hole” (submitted) , joint work with D. Bini and A. Geralico.

Pereira Lobo Iarley

Position: CAPES-ICRANet Ph.D. Student
Period covered: 2016

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 its generalization towards possible deformations of General Relativity; I also study the possibility of curved momentum spaces in such paradigm and the role of non-riemannian geometries in the description of quantum gravity phenomenology. Another topic of interest is the use of non-riemannian geometries for the description of alternative theories of gravity.

II Conferences and educational activities

II a Conferences and Other External Scientific Work

April: **BritGrav 16**, Nottingham, UK.
I presented a talk named "Extended disformal approach in the scenario of rainbow gravity".

May: **Fourth Bego Rencontres IRAP PH.D. Erasmus Mundus school**, Nice, France.

September: **Experimental Search for Quantum Gravity**, Frankfurt, Germany.

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

2016 List of Publication

G. G. Carvalho, **I. P Lobo** and E. Bittencourt, *Extended disformal approach in the scenario of rainbow gravity*, Phys. Rev. D **93** 044005 (2016), arXiv:gr-qc/151100495.

I. P. Lobo and G. Palmisano, *Geometric interpretation of Planck-scale-deformed co-products,* Int. J. Mod. Phy. Conf. Ser. **41** 1660126 (2016).

I. P. Lobo, N. Loret and F. Nettel, *Rainbows without unicorns: Metric structures in theories with Modified Dispersion Relations,* arXiv:gr-qc/1610.04277, submitted to Phys. Lett. B.

I. P. Lobo, *Frame transformations in Brans-Dicke theory from the viewpoint of Weyl geometry,* arXiv:gr-qc/1610.05004, submitted to Int. J. Mod. Phys. D.

Administrative, Secretarial and Technical Staff

Adamo Cristina

E mail address	cristina.adamo@icranet.org
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Fax	+39 085 4219252
Nationality	Italian
Date and place of birth	Vibo Valentia, 12 December 1972

Work experiences

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. RI.BA. emission. Down-payment and invoice discount management. Payment and takings management. Independent management of the main civil-fiscal fulfilments with a particular attention to the periodical settling and vat statement. General account management. Assets management. Arrangement INTRA model. Arrangement of the financial year ending. Reclassification of the budget. Management of the accounting plan. Implementation of new instruments aiming at improving the efficiency of the administrative services. Administrative management of the staff: recruitment and selection interviews, drawing up of mandatory documents (matriculation and presences books), elaboration of timesheets. Management of clients and suppliers' order. Purchase and choice of suppliers to be qualified. Prices definition, deposit and shipment management.
Name and address of employer	Solaris Srl - Manoppello (PE) - Industrial Springs Production

Date	01 April 2001 - 28 January 2004
Occupation or position held	Responsible for marketing planning
Main activities and responsibilities	Evaluation of markets perspective. Coordination and reduction of commercial plans. Survey of the competition sale prices Coordination of marketing plans and commercial budgets

Name and address of employer	Merker SpA - Trucks production
Date	1997 - 2000
Title of qualification awarded	Trainee at a Business Consultant
Principal subjects / occupational skills covered	Ordinary and simplified account. Fiscal fulfilments. European balance. Income tax return.
	Consultant office Dott. Vincenzo Micozzi - Pescara
Date	1997 - 31/03/2001
Principal subjects / occupational skills covered	Responsible for Quality Insurance (ISO UNI EN 9002) Management Assistance Purchase management Administrative and fiscal fulfilments Definition of Marketing plans and monitoring of mix marketing elements
Name and address of employer	Solaris Srl - Industrial Springs production
Date	1997 - 1997
Occupation or position held	Stageur
Main activities and responsibilities	Implementation of check systems management
Name and address of employer	Software House Polymatic - Chieti Scalo

Education and training

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 Sujects	Ordinary and simplified account. Fiscal fulfilments. European balance. Income tax return.
Name and type of organisation providing education and training	Consultant office Dott. Vincenzo Micozzi - Pescara

Date	1998 - 1998
Title of qualification awarded	Brief Master on Tax Law
Name and type of organisation providing education and training	University D'Annunzio - Pescara

Date	1998 - 1998
Title of qualification awarded	Postgraduate Course on " European Union: institutional, juridical and economic aspects"
Name and type of organisation providing education and training	European Commission and University of Lyon: corse in Paris and Lyon. Success on final exams.

Dates	1997 - 1997
Title of qualification awarded	Expert in enterprise management
Main Subjects	Purchase and logistics, financing, administration and control, marketing, production, budget, bringing out of new products
Name and type of organisation providing education and training	Regione Abruzzo - CIFAP

Dates	1997 - 1997
Title of qualification awarded	Evaluator of Quality systems
Main subjects	Expert according to the ISO regulations. Qualification for leading controls according to the UNI EN 9002 regulations.

Personal skills and competences

Mother tongue	Italian
English	Indipendent User
French	Basic User
Social skills and competences	Communication Ability acquired during the working experiences Aptitude to learn, adaptable to new situations, different from the known ones. Ability to work under pressure. Good aptitude to work in multicultural environment thanks to the experiences spent abroad for education or personal reasons. Team spirit
Organisational skills and competences	Innate sense of organisation both in the working place and in the management of personal and familiar life. I am considered as a reference point by the production operators.

Technical skills and competences	Mastery in quality control processes in small enterprises (I was responsible for the qualily evaluation)
Computer skills and competences	Good Knowledge of Microsoft Office (Word, Excel e PowerPoint) Very good knowledge of Team System – Gamma, Mult program Basic knowledge of graphic application Good knowledge of Internet and web search engines.

Gabriele Attilio Brandolini

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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 ICRANet - International Center for Relativistic Astrophysics Network
Kind of Employment	System manager
Main activities and responsibilities	Network administrator – Web development

Date	2011 - 2011
Name of employer	Tipografia F.lli Brandolini snc
Kind of Employment	Graphic designer
Main activities and responsibilities	Network administrator Graphic design and layout texts

Date	2010-2010
Name of employer	Soabit srl c/o Univesità degli Studi “G. d'Annunzio” - Chieti
Kind of Employment	Help desk
Main activities and responsibilities	Web development: analysis and development of applications for managing stock of average complexity using PHP and MySQL technologies. Network administrator: support to the installation of network devices and updating of its firmware, to the segmentation of local area network (VLAN 802.1q) and support to troubleshooting activities. Network management: implementation of procedures for the historicizing of traffic flows (NetFlow / PMAcct) generated by the various firewalls on the various local networks.

Date	2009 - 2009
Name of employer	Tipografia F.lli Brandolini snc
Kind of Employment	Graphic designer
Main activities and responsibilities	Network administrator Graphic design and layout texts

Education

Date	September 2005 – 18 December 2012
Title of qualification awarded	Degree in Computer Science
Name and type of organisation providing education and training	University of L'Aquila – Final marks: 88/110 Thesis: "Analisi di prestazioni dell'instradamento in reti di sensori wireless"

Dates	September 2009 – July 2005
Title of qualification awarded	Secondary School Degree
Name and type of organisation providing education and training	Istituto Tecnico Industriale Statale "Luigi di Savoia" - Chieti

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
Computer skills and competences	Excellent knowledge of Operating Systems: Windows, Mac OS X and Linux. Excellent knowledge of Apple and Microsoft applications and Microsoft Office. Excellent knowledge, also, of various graphics and layout software. Excellent ability to use the Internet and manage applications that use them. Management of Local Area Networks LAN and WLAN and implementation of web applications. Excellent knowledge of HTML, PHP, CSS, Javascript, jQuery, MySQL. Good knowledge of C, C++, Java, VPN, Firewalling. Good knowledge of virtualization platforms, with particular reference to XEN Server (v. 7, open-source).

Other skills and competences	Considerable passion for the sport, followed and practiced.
Driving licence	Driving licence cat. A – B.

Ciampaglione Maria

PHONE	+39 388 4736792
EMAIL	mariaciampaglione@gmail.com
NATIONALITY	Italian
DATE AND PLACE OF BIRTH	Popoli, 9 September 1983

WORK EXEPERIENCE

JUNE 206	ICRANET – International Center for Relativistic Astrophysics Network Secretariat office and communication
APRIL 2014 – MAY 2016	Istituto Nazionale per la Comunicazione - Roma Social Media Strategist and Digital Strategist PR •Content strategy for: UNAITALIA (Unione Nazionale Filiere Agroalimentari Delle Carni e Delle Uova), AIDEPI (Associazione delle Industrie del Dolce e della Pasta Italiane) e ASSOBIRRA (Associazione degli Industriali della Birra e del Malto) •Social media strategy for: MasterCard Italia, UNAITALIA, AIDEPI, ASSOBIRRA, UNHCR – Alto Commissariato delle Nazioni Unite per i rifugiati. •Digital pr for MasterCard, PLAYSTATION Italia, UNAITALIA, ASSOBIRRA, AIDEPI, UNAITALIA, UNHCR – Alto Commissariato delle Nazioni Unite per i rifugiati
DECEMBER 2013 - MARCH 2014	One Group srl - L'Aquila Marketing and communication Consultant in the field of the marketing and the communication, for publishing activity, press office and for promotion's project.
NOVEMBER 2011 - NOVEMBER 2013	404 Communication Agency - Roma Junior Account and Social Media Manager Press office online, media relations online, brand monitoring, online web reputation, web analytics e social media manager for: Warner Bros, Lucky Red, Bolero Film, Scuderie del Quirinale, Palazzo delle Esposizioni, Ministero dei Trasporti e delle infrastrutture, ANICA, Motion Picture Association of America, UNIVIDEO.
MAY2011 A NOVEMBER 2011	PMS – Financial and Corporate Communications - Milano Junior Account Press Office corporate, media relations online, brand monitoring, online web reputation, web analytics e gestione crisis management for: Barclays, ATM (Servizio di trasporti pubblici Milano), Chiomenti Studio Legale, Alpha Private

Equity, Fondo ReEnergy Capital.

EDUCATION

NOVEMBER 2010 – MAY 2011	12° Master Media Relations e Comunicazione digitale (Full time) Business School del Sole 24 ORE, Milano Press Office, Media relation online, Digital Communiocation, I Social Media, Web Community, Financial Communications, Crisis Management, Public Communication
MARCH 2008 - APRIL 2010	Università degli Studi di Roma La Sapienza Faculty of Political Science – Degree in Careers and International Functions
FEBRUARY 2008	Università degli Studi di Roma La Sapienza Faculty of Political Science – Degree in Political Science and International Relationsi
JUNE 2002	Liceo Classico Ovidio di Sulmona

PERSONAL SKILLS AND COMPETENCES

Mother tongue	Italian
Inglese	Good
Francese	Good
Social Skills	Good Relational abilities handling nei precedenti lavori and good apitude to work in team.
Computer Skills and competences	Very good command of Microsoft Office (Word, Excel and Power Pont) Very good knowledge of Internet and web search engines.

Di Berardino Federica

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NATIONALITY	Italian
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
- Travel Agent at "Beg Viaggi" Pescara;

September-June 2005
- Italian language trainer for foreign students;

April 2005
- Congress Hostess for IN FIERA S.r.l., at "ECOTUR 2005"-Montesilvano;

December 2004
- Congress Hostess for Manoppello Municipality (PE) on the occasion of the commemoration "Marcinelle 2005";

October-December 2004
- Customer service assistant for Terravision S.r.l. at *Aeroporto d'Abruzzo*, Pescara;

January-December 2004
- Trainer/Supporter to elementary and high school Italian students for English language homeworks;

May 2004
- Translations from/to English;
- Distribution of books in the local schools for Ajilon Agency,

March 2004	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.);
2001-2004	▪ 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 laude*, 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. Music. Free time: art, music, travel and photography.
DRIVING LICENCE	Driving license cat. B

europass Curriculum vitae

PERSONAL INFORMATION

Marco Di Ianni

Via Muzio Pansa 3, 66100 Chieti (italia)

3669998849

marco.diianni.3@gmail.com

WORK EXPERIENCE

01/07/2016–Present

System Manager

Soabit c/o ICRANet, Chieti (Italy)

Network management and maintenance of computer

01/07/2014–21/07/2014

Work-related learning Accounting Administrative Assistant

Walter Tosto SpA, Chieti (Italy)

Supplier relationships, determination of the depreciation charge and storage of invoice.

EDUCATION AND TRAINING

2015–Present

Degree in Economics and Information Technology

Università degli Studi "G. d'Annunzio" Chieti - Pescara, Pescara (Italy)

2010–2015

Secondary school degree Accountant and Programmer

Istituto tecnico Galiani-De Sterlich, Chieti (Italy)

Evaluation **90/100**

2013–2015

CCNA Discovery

Cisco CCNA Discovery: Networking for home and small businesses.

Network management, security and troubleshoot problem.

2014–2015

ECDL Certificate

European Computer Driving Licence Certificate.

PERSONAL SKILLS

Mother tongue(s): Italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	B1	B1	B1	B1	B1
	Trinity College London B1.2				
French	A2	A2	A2	A2	A2

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user
Common European Framework of Reference for Languages

Communication skills: Fluent human relations in different contexts

Organisational / managerial skills: Good Cooperation in Group

Digital competence

SELF-ASSESSMENT				
Information processing	Communication	Content creation	Safety	Problem solving
Independent user	Proficient user	Independent user	Proficient user	Proficient user

Digital competences - Self-assessment grid

Cisco CCNA Discovery
Certificato ECDL
Attestazione Google Made in Italy: Eccellenze in digitale

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 ǀ Fax +39.0731.814.700

Date	From October 2012
Occupation or position held	Conference interpreting and translations.
Name and address of employer	OS-Card Srl – Bologna

Date	May 2012 → September 2012
Occupation or position held	Junior Export Manager
Main activities and responsibilities	Brazil country analysis. Brazilian Portuguese website translation. Company profile in Brazilian Portuguese language.
Name and address of employer	Marzoarreda – Novoli (LE)

Date	September 2011 → January 2013
Occupation or position held	Stageur
Main activities and responsibilities	Legal Office – Notary services Drafting of documents concerning: general/special power of attorney, will and testament of citizens living abroad, public acts, certificates of authentications, self-certifications and official certificates that can be replaced by self-certifications.
Name and address of employer	Italian General Consulate in Brazil – São Paulo Aveinda Paulista, 1963; CEP 01311-300 São Paulo (SP)

Date	October 2011 → January 2012
Occupation or position held	Italian teacher
Main activities and responsibilities	Italian teacher for native Brazilian students. Private lessons and classes. Conference interpreter for 30th São Paulo *Venice Architecture Biennial* 2012
Name and address of employer	Italian Institute of Culture in Brazil – São Paulo Avenida Higienópolis, 436; CEP 01238-000, São Paulo (SP)

Date	January → July 2011
Occupation or position held	Internship
Main activities	Editing, proofreading.
Name and address of employer	Edizioni dell'Urogallo – Literature from Portuguese-speaking countries

Education and training

Date	February → July 2013
Title of qualification awarded	Postgraduate master course in International Management
Name and type of organisation providing education and training	ISTAO – Istituto Adriano Olivetti di Studi per la gestione dell'economia e delle aziende The Masters Course in International Management prepares highly specialized students in the field of international business and trade. Organized in collaboration with ICE (Governamental Agency for the internationalization of Italian companies), Confindustria Marche (Italian Employers' federation) and the Government of the Marche Region, the Master represents one of the most important and valuable programs for new graduates approaching the business world focused on the themes of internationalization: macroeconomics and global markets, enterprise organization, emerging countries, strategies and decision-making skills, contracts, rules, techniques.

Date	May 2012
Title of qualification awarded	CEDILS Certificate Certified teacher for Italian as foreign language
Name and type of organisation providing education and training	Ca' Foscari – University of Venice

Date	November 2008 → 11 July 2011
Title of qualification awarded	Master degree in *Languages for international communication – Portugues EU/BR and Spanish*
Name and type of organisation providing education and training	Univerità degli Studi di Perugia Final marks: 110/110 cum laude Thesis: "Way to Europe. Portugal and the European integration process"

Date	November – December 2010
Title of qualification awarded	Brief Master on Europroject Management 2007-2013
Name and type of organisation providing education and training	Introduction to European Union: institutional, juridical and economic aspects. Training courses: full lifecycle of an EC funded project: proposal preparation and submission, evaluation, negotiation, technical and financial project management, reporting, technical reviews and post-project audits.

Date	November 2004 → 9 November 2008
Title of qualification awarded	Degree in *Linguistic and Cultural Mediation Sciences – Portugues EU/BR and Spanish*
Name and type of organisation providing education and training	Univerità degli Studi di Perugia Final marks: 110/110 cum laude Thesis: Modern poetry in Portugal.

Dates	1999 - 2004
Title of qualification awarded	Secondary School Degree
Name and type of organisation providing education and training	Liceo Linguistico Carlo Troya – Andria (BT)

Personal skills and competences

Mother tongue	Italian
Portuguese	Second language
Spanish	Very good
English	Good
French	Basic User

Social skills and competences	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.
Organisational skills and competences	Very good sense of organisation and time planning abilities; Self rigorousness and self discipline; Good analytical and problem-solving abilities, gained during all study years and especially during internship at Italian General Consulate in Brazil (the Vice-Consul signed my letter of recommendation)
Computer skills and competences	Very good command of Microsoft Office (Word, Excel e PowerPoint); Very good knowledge of Internet and web search engines; Knowledge of graphic application.

Di Vito Francesca

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EMAIL	francescadivito@live.it
NATIONALITY	Italian
DATE AND PLACE OF BIRTH	Termoli, 22 September 1977

WORK EXEPERIENCE

JUNE 2016	ICRANET – International Center for Relativistic Astrophysics Network Administration assistant
OCTOBER 2015 – JUNE 2016	Di Vito Account office – Montenero Di Bisaccia Administration Assistant Plan, organize and facilitate the activities director, as well as the customer relationship. Preparation of letters, memoranda and reports. Prepare and secretarial meetings. Elaboration of account movements and management requirements for the administration of personnel.
OCTOBER 2012 - SPTEMBER 2015	A.G.C.O.- Brazil CEO executive assistant/ Administrative assistant Executive Assistant to the top level of this global wide company - President - GSI/ Vice President - Global Grain & Protein, Vice President - Global Product Mgmt & Technology, CFO, COO, Corporate Controller, and Director of Finance. Essential responsibilities: Provide administrative support and regular updates to the executive management team's calendars, phones, travels, and correspondences; as well as organizing and maintaining files, and expense reports. Answer the telephone of the executive management team and proactively facilitate communication of missed calls to executive staff as needed. Arrange meetings requiring coordination with various parties including senior executives, board of directors, investors, etc. Coordinate programs, events, or conferences by arranging logistics (including facilities and catering) and invitations, coordinating speakers, and controlling expenses of events within budget. . Organize and administer travel arrangements for senior management team as needed. Also take care of passports and visas. Organize and control the Logistic of the company cars .Work independently, take intuitive and anticipates the needs of the executive management team. Routinely handle and prepare sensitive and confidential information. Also serve as "Corporate Office Manager" – handling routine

office issues by: -Ensuring Conference Rooms are kept neat and ready for use; -Overseeing the lobby and front desk area to ensure it is neat and provides a professional setting; -Managing Office Logistics.

MAY 2012 - OCTOBER 2012

TRIBOS Editor and Distributor of Books
- Brazil
Secretary and International Trade Negotiator
Provide administrative support and regular updates to the executive management team's calendars, phones, travels, and correspondences; as well as organizing and maintaining files, and expense reports. Answer the telephone of the executive management team and proactively facilitate communication of missed calls to executive staff as needed. Arrange meetings requiring coordination with various parties including senior executives, board of directors, investors, etc. Coordinate programs, events, or conferences by arranging logistics (including facilities and catering) and invitations, coordinating speakers, and controlling expenses of events within budget.
Contacting, analyzing the international books sample, negotiating the price of selling, coordinating the process of importation, translation of the same books into Brazilian language, and starting the process of distribution in all Brazil.

OCTOBER 2011 – MAY 2012

SANTIN Engineering, and Assembly construction in TURN-KEY)Final client : Manitowoc (USA)
- Brazil
Executive Secretary and Technical assistance Analyst
Plan, organize and facilitate the director activities, as well as the customer relationship; translator during meetings with U.S. main customers. Assist in administrative and financial activities: billing, payment request, quotation and product purchases; Answer telephone / mail and commercial representatives on demands for technical assistance work; Prepare monthly closing report (manpower, travel, vehicles rental ; supporting catering company in the fields; purchases of materials);
Management of contract documents and information relating to works and services;
Making follow up of agendas and supporting the internal Technicians Assembly;
Organizing files;
Provide support to management programming and monitoring of activities in the field of work;

OCTOBER 2010 – AUGUST 2011	Kin Master, Chemicals and Pharmaceuticals LTD - Brazil Assistant international Trade / HR / Quality Control

International Trade: Execution and issuance of export documents, shipping labels of products for export, shipment of samples to foreign markets, maintaining and updating records of exports and imports to allow the traceability of products sold and bought, for issuance of invoice export, customer contact and service domestic and international implementation of international freight quotations for imports and exports, translations of documents in different languages (English, Italian, French and Spanish)HR: Performance of admission of selected candidates seeking admission medical examination and other tests required by the job, keep up the registry data of employees, to facilitate the identification of company officials, registration of new employees in the company's internal system, registration of digital new employees to record the point; receipt of resumes and pre examine the same before forwarding to management and interview in English when necessary, controlling the fulfillment of the company's vacation plan, guaranteeing the issuance of reports of overtime, and coordinate control the periodic medical examinations; contact with the right contractor for execution and control of the PPRA and PCMSO, ensuring continuous updating them.Quality Control: Conference and file OP (Production Order).Conference documentation and file batches. OP's issue and control issue and file the form of occupation of equipment. Revision of SOP (Standard Operating Procedure) and OP's, Issuing and filing of the cleaning sheets daily record sheet production and yield of products manufactured, issuance and amendment and file all technical documentation. Dispensing materials and products

EDUCATION

OCTOBER 2013 – OCTOBER 2015	Master in Business Administration (Full time) (Fundacao Getulio Vargas)Brazil
GENNUARY 2007 – JULY 2007	London Metropolitan University (UK) Proficiency upgrade in English Language
JULY 2004	University Bologna –Alma Mater Studiorum Faculty of Foreign Languages – Degree in Foreign Languages and Literature (English and Spanish)

JUNE 1996	Linguistic College "Gesù e Maria" Termoli

PERSONAL SKILLS AND COMPETENCES

Mother tongue	Italian
English	Excellent
French	Good
Spanish	Good
Portuguese	Excellent

Social Skills	Good Relational abilities handling from previous jobs and good attitude to work in team.
Computer Skills and competences	Very good command of Microsoft Office (Word, Excel and Power Pont) Very good knowledge of Internet and web search engines. Very good knowledge in SAP (ERP),Package Office (Outlook, Word, Excel and Power Point) and Team System

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: "*La leva finanziaria e la leva operative nel settore pastario*" (supervisor Prof. Michele A. Rea)
• Mark	110/110 *cum laude*

• Date	09/2001 – 11/2005
• Institution	Università degli Studi "G. D'Annunzio" Pescara
• Main Subjects	Financial Mathematics, bank technique, business economics, accountancy, microeconomics, macroeconomics, private and public law, work law, analysis of balance sheet, business strategy and politics
• Achieved Qualification	Business Economics Degree. Final thesis in business strategy and politics: "*Gli strumenti di analisi strategica: l'analisi SWOT"* (supervisor Prof. Michele A. Rea)
• Mark	106/110

• Date	09/1996 – 07/2001
• Institution	Secondary School focusing on sciences- Liceo Ginnasio Statale "Publio Virgilio Marone" Vico del Gargano (FG)
• Main Subjects	Mathematics analysis, Italian language and literature, Latin language and literature, Chemistry, Physics
• Achieved Qualification	Scientific school-leaving certificate
• Mark	100/100

FOREIGN LANGUAGES	
MOTHER-TONGUE	ITALIAN
OTHER LANGUAGES	ENGLISH (GOOD) – FRENCH (ELEMENTARY)
RELATIONAL ABILITIES	Good relational abilities thanks to the past work experience at DelVerde and to the present experience at ICRANet. Self-reliant. Good listener.
ORGANIZING COMPETENCES	Good organizing abilities acquired handling the big amount of data at DelVerde and working at ICRANet, where they are essential for managing the large number of guests, mainly during the meetings.
TECHNICAL SKILLS	Computers competences: Windows. Softwares: Word, Excel, Power Point. Very good use of Internet and e-mail accounts. Good use of cost-accounting system HELPAZI and bank system BNL Businessway. Elementary knowledge of HTML e CSS programs for websites. Knowledge of "TOP VALUE" program for financial diagnosis and corporate planning.
ARTISTIC SKILLS	Piano classes attended for 8 years. sol-fa Diploma.
DRIVING LICENCE	Driving licence cat. B
FURTHER INFORMATION	I like travelling, cooking, cinema, listening music, playing the piano. I have a determined, dynamic and flexible personality. I like staying and working with people.

europass Curriculum Vitae

PERSONAL INFORMATION

Damiano Verzulli

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+39 3495893862 (*"Telegram" enabled*)

damiano@verzulli.it

Date of birth Sep. 28th, 1971 | Nationality Italian

WORK EXPERIENCE

from may 2003, up to now — System & Network specialist (Consultant)

Università degli Studi "G. d'Annunzio" di Chieti-Pescara, Chieti (Italia)
http://www.unich.it

- Network management (3.300 interconnected hosts distributed around hundreds VLAN and 7 remote sites; 3x1Gbps Internet backbone [GARR]; a layered server farm focused on both services and security): monitoring, fixing, capacity planning;
- System management, with particular focus to the university e-mail platform (several servers; 2.500 mailboxes; more than 4TB of on-line storage) and virtualization environment (more than 30 VMs powered by a (phasing-out) vmWare ESX cluster and a (increasingly adopting) XEN Server 7 environment);
- System management of the underlying hardware infrastructure: DELL Blade Center m1000e with related blade-servers; an EMC^2 SAN (one storage array with four additional enclosures); a multilayer backup infrastructure; a web-hosting platform (several LAMP stacks); various other IT systems (logging, monitoring, TTS, VPN, etc.);
- Security management: ensuring proper security levels among all layers of ICT infrastuctures:
  - Layer 2: wired 802.1x; wireless 802.1x; Radius AAA infrastructures;
  - Layer 3: firewalling, security assessment, Network-based Intrusion Detection Systems, ip-flow analysis (*NetFlow/IPFIX, SFLOW*) with particular focus on BotNet detection;
  - Layer 4 – Layer 7: Host-based Intrusion Detection Systems; Log analysis; Application specific vulnerabilities and patching; web-platforms hardenization (*Apache mod-security and reverse proxies);* incident handling and response, including source code-analysis of (web-based) malware;
  - Cross-layers: infrastructure planning and deployment (virtual infrastructures [*Vmware, XEN*] and related deployment [Hardware, Networking, Clustering, VM deployments, Backup & D/R]
- 2° level support towards underlying software stacks, with a particular focus to "open-source" technologies (linux, apache, mysql, php, rsyslog, pmacct, nagios, munin, postfix, courier, etc.);

april 2010 - august 2010 — IT Specialist

MIUR – Italian Ministry of Education, Universities and Research

- Member of the technical-staff established by the Italian Ministry of Education, University and Research to plan and conduct the Five-Year Research Evaluation 2004-2008 Exercise [1]

[1] http://civr.miur.it/en/vqrteam.html - http://civr.miur.it/en/index.html

april 2010– december 2013

IT Specialist

MIUR – Italian Ministry of Education, Universities and Research

- External member of the technical-commettee of the "Università Digitale" project, funded by the Italian Department of Public Administration and Innovation and involving ICT development and cooperation among 23 Italian universities and the Italian Ministry of Education, Universities and Research.
  As an external member, he attended 15 meetings and directly supported the communication within the group by creating and managing several mailing-lists and a private intranet/website;

March 2005 - march 2007

Project Manager - TOSSAD (FP6)

- Project Manager for TOSSAD – Towards Open Source Software Adoption and Dissemination -, an EU project funded under the FP6 IST program (Contract No. 015981 signed on march 22nd 2005) whose objective was "*...to start integrating and exploiting already formed methodologies, strategies, skills and technologies in F/OSS domain in order to help governmental bodies, educational institutions and SMEs to share research results, establish synergies, build partnerships and innovate in an enlarged Europe...*" .
  In TOSSAD he was involved in WorkPackage 3, leading the delivery process of several project-deliverables.

september 1999 – february 2003

Project Manager and Team Leader

Nextra Spa (a former Telenor Norway Company), Casalecchio di Reno (BO) - Italy

- Web-development Team Leader, coordinating a team of 5 to 12 people;
- Project Manager for various web-portal contracts;
- Local contact point, towards "corporate", for all the issues related to web-development software technologies and web-development hardware and system infrastructures.
- System administrator of the web-hosting platform.

As such he had the change to often travel abroad, all-around other Nextra Europe sites as well as to corporate headquarter, in Norway.

May 1996 – august 1999

Internet Application Developer

CINECA - Consorzio Interuniversitario, Casalecchio di Reno (BO) - Italy

- Web developer (Perl/CGI; PHP; Postgresql; MySQL);

- Junior sysadmin for IRIX and HP-UX platforms powering the web-hosting services;

EDUCATION AND TRAINING

1991 - 1995

Computer Science degree

University of L'Aquila – Italy - with full marks *(110 cum laude)*

The thesis titled "*Multidimensional Interval Routing techniques*" researched some routing topics in specic network environments.

PERSONAL SKILLS

Mother tongue(s): Italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	B2	B2

Levels: A1/2: Basic user - B1/2: Independent \user - C1/2 Proficient user
Common European Framework of Reference for Languages

Organisational / managerial skills

- Significant project-management attidute and skills mainly thanks to previous working experience, also in multicultural/international team;
- Being able to (comfortably) speak to both technical and non-technical targets, even within medium/large conferences. As an example:
  - 2005: “Free Software World Conference” - 26/10/2005, Badajoz, Spain
  - 2009: “GARR Workshop” - 17/06/2009, Rome, Italy
- Being able to present/discuss deeply technical topics to non-technical decision-makers (CEOs, CFOs, etc.);
- Presenting an uncommon balance between technical knowledge, capacity to deliver, team-working and customer satisfaction.

Computer skills

- Deep knowledge of Linux-based systems;
- Good knowledge of Microsoft “server” platforms (Domain, Active Directory, etc.), with particular reference to the interoperability/integration with Linux environments;
- Deep knowledge of networking technologies, ranging from Layer 2 (Ethernet) up to Layer 7 Internet protocols (HTTP, FTP, SMTP, SNMP, DNS, NTP, SYSLOG, POP/IMAP, SSL, etc.)
- Good “web programming” skills, mainly as PHP and PERL development but also with respect to current/modern WEB 2.0 pattern (AngularJS and other Javascript platforms/frameworks, Bootstrap CSS, NoSQL);
- Good knowledge of DBMS technologies, with particular reference to SQL language and MySQL/MariaDB engine;
- Good knowledge of collaborative development technologies (GIT);
- Good knowledge of virtualization platforms, with particular reference to VMware ESX/vSphere and XEN Server (v. 7, open-source);
- Deep knowledge of the Open-Source and Free Software movements, with particular reference to their impact towards Public Administrations and, more in general, to the Society as a whole.

ADDITIONAL INFORMATION

Additional information

- Very “open minded” and “technology” addicted;
- Really interested in the security side of the Internet technologies, expecially related to web-security (web application vulnerabilities) and network traffic analysis (BotNet detection);
- “Arduino” and “ESP8266” microcontroller addicted. Really interested in deepen related know-how, expecially regarding the current and future IoT trends;
- Member of the great StackExchange community, with particular reference to the ServerFault portal (http://serverfault.com/users/251104/damiano-verzulli ; 5 questions and 50 answers for a 1916 current score);
- Aiming to work in multicultural and multiethnical context, better if in “international” groups/companies;
- he'd like to be involved as project-manager for medium/large projects, better if in medium/large "global" companies, even better if with Free/Open-Source-Software as a common base for such projects;
- he would like to continue to broaden his knowledge about Internet technologies and to always “stay-inline" with technology news and trends.