

## Curriculum Vitae

### Bruno Giacomazzo

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### Research Interests

computational astrophysics; numerical relativity; gravitational waves; neutron star collapse; binary neutron stars; black hole binaries; gamma-ray bursts; relativistic magnetohydrodynamics

### Positions

October 2011 - to date: Research Associate  
*Institution:* JILA, University of Colorado, Boulder (CO), USA

October 2009 - September 2011: Research Associate  
*Institution:* University of Maryland, College Park (MD), USA  
joint with NASA Goddard Space Flight Center, USA

November 2006 - September 2009: PostDoc  
*Institution:* Max Planck Institute for Gravitational Physics  
(Albert Einstein Institute), Potsdam, Germany

### Education

2002 - 2006: Ph.D. training at SISSA, Trieste, Italy.  
*Degree:* PhD in Astrophysics.  
*Date:* October 26<sup>th</sup>, 2006.  
*Supervisor:* Prof. Luciano Rezzolla.  
*Thesis:* General Relativistic Magnetohydrodynamics: fundamental aspects and applications

1996 - 2002: Undergraduate studies in Physics at the University of Parma, Parma, Italy.  
*Degree:* M.Sc. in Physics (Laurea 110/110).  
*Date:* July 17<sup>th</sup>, 2002.  
*Advisor:* Prof. Enrico Onofri.  
*Thesis:* Sviluppo di algoritmi per lo studio della materia al collasso gravitazionale  
(Development of algorithms to study matter at gravitational collapse)

## Grants

- PI, *pending* NSF Astronomy and Astrophysics research grant (3 years, \$483326, 2012-2015)
- PI, NASA Fermi-GI proposal 51024 (2 years, \$160000, 2012-2014)
- PI, 6.4 million service units NSF Teragrid computer time grant TG-PHY110027, 2011-2012
- co-I (PI Sean McWilliams), 1.5 million service units NSF Teragrid computer time grant TG-AST100027, 2010-2011
- co-PI (PI Erik Schnetter), 21.2 million service units NSF Teragrid computer time grant TG-MCA02N014, 2010

## Teaching Experience

- May 6 2008: 2 hour lecture on “Gravitational Collapse” given at the 3<sup>rd</sup> VESF School on Gravitational Waves, Cascina (Pisa), Italy
- March 18 2008: 45 minute lecture on “Numerical Relativity at AEI: Simulating Single and Binary Neutron Stars” given at the *Ferienkurs in Gravitationsphysik 2008* (Semester break courses on Gravitational Physics) at AEI, Potsdam, Germany

## Students Mentored (4 undergraduates, 5 graduates)

- JILA, University of Colorado (2011-present)
  - John Mark Demopoulos: undergraduate student
- University of Maryland and NASA GSFC (2009-2011):
  - Philip Cowperthwaite: undergraduate student (2011 summer internship at NASA Goddard Space Flight Center)
  - John Capone: graduate student (2010 summer internship at NASA Goddard Space Flight Center)
- Albert Einstein Institute (2006-2009):
  - Kyriaki Dionysopoulou: graduate student (advisor L. Rezzolla)
  - Filippo Galeazzi: graduate student (advisor L. Rezzolla)
  - Aaryn Tonita: graduate student (advisor L. Rezzolla)
  - Thorsten Kellermann: graduate student (2011, advisor L. Rezzolla)
  - David Link: undergraduate student (2009, advisor L. Rezzolla)
  - Filippo Galeazzi: undergraduate student (2008, advisor L. Rezzolla)

## Professional Activities

Referee for:	<i>Astrophysical Journal, Astrophysical Journal Letters, Astrophysics and Space Science, Classical and Quantum Gravity, Journal of Fluid Mechanics, Mathematical Reviews, SIGMA: Symmetry, Integrability and Geometry: Methods and Applications</i>
January 2010 - Present:	Member of the American Physical Society
October 2010 - September 2011:	Organizer of Seminars on Computational Astrophysics at NASA Goddard Space Flight Center, Greenbelt, MD, USA
January 2007 - July 2009:	Organizer of Seminars and Journal Clubs for the Numerical Relativity group at AEI, Potsdam, Germany
April 7 - 8 2008:	Organizer (together with R. De Pietri and L. Rezzolla) of the Whisky Retreat 2008, Parma, Italy
November 2004 - October 2006:	PhD Students' Representative for the Astrophysics Sector at SISSA, Trieste, Italy

## Press Releases

- April 7, 2011: NASA press release No. 11-103, "Breakthrough Study Confirms Cause Of Short Gamma-Ray Bursts", [http://www.nasa.gov/home/hqnews/2011/apr/HQ\\_11-103\\_Gamma\\_Rays.html](http://www.nasa.gov/home/hqnews/2011/apr/HQ_11-103_Gamma_Rays.html)

## Numerical Codes

- developer of the general relativistic magnetohydrodynamic code **Whisky**
- developer of the first complete exact Riemann solver for relativistic MHD

## Computational Skills

Operating Systems:	DOS, Linux, Mac OS X, Windows
Programming Languages:	C, C++, Fortran 77, Fortran 90
Software:	Amira, Mathematica, Matlab, OpenDX, VisIt
Working experience:	Computer Management Assistant of the Astrophysics sector at SISSA (Nov 2004 - Oct 2006)
Scientific Visualization:	very good experience in visualizing results from numerical simulations through the use of programs such as VisIt, Matlab and OpenDX
High-performance computing:	very good experience in using several HPC resources

## Invited Seminars and Talks (14 in total)

- March 12 2012: **invited seminar** at CITA (Toronto, Canada) on “General Relativistic Magnetohydrodynamic Simulations of Neutron Stars and Black Holes”
- September 7 - 9 2011: “Parma Workshop on Numerical Relativity and Gravitational Waves 2011”, University of Parma, Italy  
- **invited talk** on “Magnetized Binary Neutron Star Mergers”
- June 13 - 17 2011: Conference “Astronom 2011”, Valencia, Spain  
- **invited talk** on “Magnetized Binary Neutron Star Mergers”
- October 15 2010: **invited seminar** at JILA, University of Colorado (Boulder, Colorado, USA) on “General Relativistic Simulations of Binary Neutron Star Mergers”
- February 26 2010: **invited seminar** at Canadian Institute for Theoretical Astrophysics (Toronto, Canada) on “General Relativistic Simulations of Binary Neutron Star Mergers”
- February 25 2010: **invited seminar** at Perimeter Institute (Waterloo, Canada) on “General Relativistic Simulations of Single and Binary Neutron Stars”
- January 26 - 29 2010: Conference “14th Gravitational Wave Data Analysis Workshop”, University of Rome “La Sapienza”, Rome, Italy  
- **invited talk** on “General Relativistic Simulations of Compact Binaries”
- December 9 - 11 2009: Gravitational Wave Bursts Meeting, Chichen-Itza, Yucatan, Mexico  
- **invited talk** on “Binary NSs and NS-BH mergers: a theoretical overview”
- November 2 2009: CIGR Collaboration Meeting, GeorgiaTech, Atlanta, Georgia, USA  
- **invited talk** on “The Whisky(MHD) code”
- October 19 2009: **invited seminar** at the Physics Department of the University of Maryland (College Park, Maryland, USA) on “General Relativistic Simulations of Binary Neutron Stars: Gravitational Waves and Matter Dynamics”
- June 18-20 2009: Workshop on “Probing Neutron Stars with Gravitational Waves”, State College, Pennsylvania, USA  
- **invited talk** on “GR Simulations of Binary NSs: GWs and matter dynamics”
- February 17 2009: ILIAS 6th Annual Meeting, Dresden, Germany  
- **invited talk** on “Fully General Relativistic Simulations of Binary Systems”
- November 13 2008: **invited seminar** at the Department of Mathematics of the Katholieke Universiteit Leuven (Leuven, Belgium) on “Fully General Relativistic Simulations of Binary Neutron Stars Mergers”
- August 8 2008: **Colloquium** at NSSTC (Huntsville, Alabama, USA) on “Fully General Relativistic Simulations of Binary Neutron Stars Mergers”

## Contributed Seminars and Talks (29 in total, only most recent ones listed)

- March 31 - April 3 2012: Meeting of the American Physical Society (Atlanta, Georgia, USA), talk on “General Relativistic Simulations of Magnetized Plasmas around Merging Supermassive Black Holes”
- April 30 - May 3 2011: Meeting of the American Physical Society (Anaheim, California, USA), talk on “General Relativistic Simulations of Magnetized Binary Neutron Stars”
- April 11 - 15 2011: Conference “Advanced Magnetohydrodynamics” (Leiden, The Netherlands), talk on “General Relativistic Magnetohydrodynamic Simulations of Binary Neutron Stars”
- January 26 - 29 2011: Conference “Gravitational Wave Physics and Astronomy Workshop” (Milwaukee, Wisconsin, USA), talk on “General Relativistic Simulations of Magnetized Binary Neutron Stars”
- November 1 - 4 2010: Conference “Gamma Ray Bursts 2010 Conference” (Annapolis, Maryland, USA), talk on “General Relativistic Simulations of Binary Neutron Star Mergers”
- June 20 - 26 2010: Conference “Theory Meets Data Analysis at Comparable and Extreme Mass Ratios” (Perimeter Institute, Waterloo, Ontario, Canada), talk on “General Relativistic Simulations of Binary Neutron Star Mergers”
- February 13 - 16 2010: Meeting of the American Physical Society (Washington DC, USA), talk on “Gravitational Waves from Magnetized Binary Neutron Star Mergers”
- January 13 - 16 2010: Conference “Computational Relativistic Astrophysics: Frontiers of MHD” (Princeton University, Princeton, New Jersey, USA), talk on “Magnetized Binary Neutron Star Mergers”
- July 6 - 9 2009: Conference “Numerical Relativity and Data Analysis 2009” (AEI, Potsdam, Germany), talk on “Gravitational Waves from Magnetized Binary Neutron Stars”
- April 21-23 2009: Conference “Neutron Stars as Gravitational Wave Sources” (INAF-OAR, Monte Porzio Catone, Italy), talk on “Magnetized Binary Neutron Stars: GWs and matter dynamics”

## Public Seminars

- September 16 2006: “The Bizarre Universe: Black Holes, Quasar, Gamma-Ray Bursts”, SISSA OpenDay, Trieste, Italy
- October 25 2005: “The Bizarre Universe: Black Holes, Quasar, Gamma-Ray Bursts”, seminar given to high-school students of UWCAd (United World College of the Adriatic) visiting SISSA, Trieste, Italy
- September 18 2004: “The Bizarre Universe: Black Holes, Quasar, Gamma-Ray Bursts”, SISSA OpenDay, Trieste, Italy

## Refereed Publications

(16 in total, h-index=12 from NASA ADS)

1. **Giacomazzo B.**, Baker J. G., Miller M. C., Reynolds C. S., and van Meter J. R. 2012, *General Relativistic Simulations of Magnetized Plasmas around Merging Supermassive Black Holes*, in press on ApJ Letters, arXiv:1203.6108
2. **Giacomazzo B.**, Rezzolla L. and Stergioulas N. 2011, *Collapse of differentially-rotating neutron stars and cosmic censorship*, Phys. Rev. D, **84**, 024022
3. Baiotti L., Damour T., **Giacomazzo B.**, Nagar A. and Rezzolla L. 2011, *Accurate numerical simulations of inspiralling binary neutron stars and their comparison with effective-one-body analytical models*, Phys. Rev. D, **84**, 024017
4. Rezzolla L., **Giacomazzo B.**, Baiotti L., Granot J., Kouveliotou C. and Aloy M. A. 2011, *The missing link: Merging neutron stars naturally produce jet-like structures and can power short Gamma-Ray Bursts*, ApJ Letters, **732**, L6
5. **Giacomazzo B.**, Rezzolla L. and Baiotti L. 2011, *Accurate evolutions of inspiralling and magnetized neutron-stars: equal-mass binaries*, Phys. Rev. D, **83**, 044014
6. Baiotti L., Damour T., **Giacomazzo B.**, Nagar A. and Rezzolla L. 2010, *Analytic modeling of tidal effects in the relativistic inspiral of binary neutron stars*, Phys. Rev. Letters, **105**, 261101
7. Rezzolla L., Baiotti L., **Giacomazzo B.**, Link D. and Font J. A. 2010, *Accurate evolutions of unequal-mass neutron-star binaries: properties of the torus and short GRB engines*, Classical and Quantum Gravity, **27**, 114105
8. Corvino G., Rezzolla L., Bernuzzi S., De Pietri R. and **Giacomazzo B.** 2010, *On the shear instability in relativistic neutron stars*, Classical and Quantum Gravity, **27**, 114104
9. **Giacomazzo B.**, Rezzolla L. and Baiotti L. 2009, *Can magnetic fields be detected during the inspiral of binary neutron stars?*, MNRAS Letters, **399**, L164-L168
10. Baiotti L., **Giacomazzo B.** and Rezzolla L. 2009, *Accurate evolutions of inspiralling neutron-star binaries: assessment of the truncation error*, Classical and Quantum Gravity, **26**, 114005
11. Mizuno Y., Zhang B., **Giacomazzo B.**, Nishikawa K.-I., Hardee P. E., Nagataki S. and Hartmann D. H. 2009, *Magnetohydrodynamic Effects in Propagating Relativistic Jets: Reverse Shock and Magnetic Acceleration*, ApJ Letters, **690**, L47-L51
12. Kellerman T., Baiotti L., **Giacomazzo B.** and Rezzolla L. 2008, *An improved formulation of the relativistic hydrodynamics equations in 2D Cartesian coordinates*, Classical and Quantum Gravity, **25**, 225007
13. Meliani Z., Keppens R. and **Giacomazzo B.** 2008, *Faranoff-Riley type I jet deceleration at density discontinuities: Relativistic hydrodynamics with realistic equation of state*, Astronomy & Astrophysics, **491**, 321-337
14. Baiotti L., **Giacomazzo B.** and Rezzolla L. 2008, *Accurate evolutions of inspiralling neutron-star binaries: prompt and delayed collapse to black hole*, Phys. Rev. D, **78**, 084033
15. **Giacomazzo B.** and Rezzolla L. 2007, *WhiskyMHD: a new numerical code for general relativistic magnetohydrodynamics*, Classical and Quantum Gravity, **24**, 235-258
16. **Giacomazzo B.** and Rezzolla L. 2006, *The Exact Solution of the Riemann Problem in Relativistic Magnetohydrodynamics*, J. Fluid Mech., **562**, 223-259

## Publications in Conference Proceedings

1. Font J. A., Rezzolla L., **Giacomazzo B.**, Baiotti L. and Link D. 2011, *Towards modelling the central engine of short GRBs*, proceedings of the “Spanish Relativity Meeting (ERE 2010)”, *Journal of Physics: Conference Series*, **314**, 012013
2. **Giacomazzo B.**, Rezzolla L., Baiotti L., Link D. and Font J. A. 2011, *General Relativistic Simulations of Binary Neutron Star Mergers*, proceedings of the “Gamma Ray Bursts 2010 Conference”, *AIP Conference Series*, **1358**, 187-190
3. Mizuno Y., Zhang B., **Giacomazzo B.**, Nishikawa K.-I., Hardee P. E., Nagataki S. and Hartmann D. H. 2009, *Magnetohydrodynamic Effects in Propagating Relativistic Ejecta: Reverse Shock and Magnetic Acceleration*, proceedings of the “GAMMA-RAY BURST: Sixth Huntsville Symposium”, *AIP Conference Series*, **1133**, 229-231

## Books

- Rezzolla L., **Giacomazzo B.**, *Numerical Methods for Hyperbolic and Parabolic PDEs*, Springer-Verlag, *in preparation*

## General Public Articles

- L. Baiotti and **B. Giacomazzo**, “*Chi fa l’onda*”, article in italian about sources of gravitational waves published by INFN (Italy) on the public magazine *Asimmetrie*, **5/9.07**, September 2007

## Personal

- *Citizenship*: Italian citizen
- *Spoken Languages*: Italian (native), English (fluent)