

# Enrico Barausse

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## Personal

- Italian Citizen
- Languages: Italian (native), English (fluent), French (working knowledge)

## Academic career

- November 2011 - present: CITA National Fellow at the University of Guelph (Canada)
- November 2008 - October 2011: Postdoctoral Research Associate, Gravitation Theory Group, University of Maryland, College Park, USA
- October 2008: Ph.D. in Astrophysics, International School for Advanced Studies (SISSA), Trieste, Italy  
Supervisors: Prof. Luciano Rezzolla, Prof. John C. Miller  
Thesis title "Exploring gravity theories with gravitational waves and compact objects"  
(in English, available from [www.glue.umd.edu/~barausse/phd.pdf](http://www.glue.umd.edu/~barausse/phd.pdf))
- June 2004: Laurea degree (MSc) in Physics: 110/110 *cum Laude*, University of Padova, Italy  
Supervisors: Prof. Sabino Matarrese, Dr. Antonio Riotto  
Thesis title "The backreaction problem in cosmology"  
(in Italian, available from [www.glue.umd.edu/~barausse/tesi.pdf](http://www.glue.umd.edu/~barausse/tesi.pdf))

## Honors and Fellowships

- CITA National Fellowship at the University of Guelph, Canada (November 2011 - October 2013)
- Humboldt Research Fellowship for Postdoctoral Researchers at the Max Planck Institute for Gravitational Physics – Albert Einstein Institute, Golm, Germany (2012-2014), declined

## Research Interests

- Gravitational Waves and General Relativity:
  - Extreme Mass Ratio Inspirals as a source of gravitational waves for LISA
  - The effect of an accretion disc on Extreme Mass Ratio Inspirals
  - The self-force problem in General Relativity

- Modelling the final spin from the coalescence of two black holes
- The cosmological evolution of the spins of supermassive black holes
- Cosmological and astrophysical gravitational waves in modified theories of gravity
- The motion of spinning particles in curved spacetimes
- The Effective-One-Body formalism
- The cosmic censorship conjecture
- Cosmology:
  - Linear and non-linear cosmological perturbations
  - The effect of matter inhomogeneities on the redshift-distance relation and on the cosmological expansion
  - Semi-analytical galaxy formation models
  - The nature of dark energy/dark matter
- Modified theories of gravity
  - $f(R)$  gravity in the Palatini and in the metric approach
  - Gauss-Bonnet gravity
  - Einstein-Aether theory
  - Experimental tests of modified gravity: Newtonian limit, Post-Newtonian expansion and Solar System tests, stellar models in alternative theories of gravity, cosmological constraints

## Publications

1. E. Barausse, S. Matarrese and A. Riotto,  
“The Effect of Inhomogeneities on the Luminosity Distance-Redshift Relation: is Dark Energy Necessary in a Perturbed Universe?”,  
Phys. Rev. D **71** (2005) 063537 [arXiv:astro-ph/0501152].
2. T. P. Sotiriou and E. Barausse,  
“Post-Newtonian expansion for Gauss-Bonnet Gravity”,  
Phys. Rev. D **75** (2007) 084007 [arXiv:gr-qc/0612065].
3. E. Barausse, L. Rezzolla, D. Petroff and M. Ansorg,  
“Gravitational waves from extreme mass ratio inspirals in non-pure Kerr spacetimes”,  
Phys. Rev. D **75** (2007) 064026 [arXiv:gr-qc/0612123].
4. E. Barausse,  
“EMRIs in non-pure Kerr spacetimes”,  
AIP Conf. Proc. **873** (2006) 264 [<http://digitalibrary.sissa.it/handle/1963/2123>].
5. E. Barausse, T. P. Sotiriou and J. C. Miller,  
“A no-go theorem for polytropic spheres in Palatini  $f(R)$  gravity”,  
Class. Quant. Grav. **25** (2008) 062001 [arXiv:gr-qc/0703132].
6. E. Barausse, S. A. Hughes and L. Rezzolla,  
“Circular and non-circular nearly horizon-skimming orbits in Kerr spacetimes”,  
Phys. Rev. D **76** (2007) 044007 [arXiv:0704.0138 gr-qc].

7. E. Barausse,  
“Relativistic dynamical friction in a collisional fluid”,  
Mon. Not. Roy. Astron. Soc. **382** (2007) 826 [arXiv:0709.0211 astro-ph].
8. E. Barausse and L. Rezzolla,  
“The influence of the hydrodynamic drag from an accretion torus on extreme mass ratio inspirals”,  
Phys. Rev. D **77** (2008) 104027 [arXiv:0711.4558 gr-qc].
9. E. Barausse, T. P. Sotiriou and J. C. Miller,  
“Curvature singularities, tidal forces and the viability of Palatini  $f(R)$  gravity”,  
Class. Quant. Grav. **25** (2008) 105008 [arXiv:0712.1141 gr-qc].
10. L. Rezzolla, E. Barausse, E. N. Dorband, D. Pollney, C. Reisswig, J. Seiler and S. Husa,  
“On the final spin from the coalescence of two black holes”,  
Phys. Rev. D **78** (2008) 044002 [arXiv:0712.3541 gr-qc].
11. E. Barausse, T. P. Sotiriou and J. C. Miller,  
“Polytropic spheres in Palatini  $f(R)$  gravity”,  
EAS Publ. Ser. **30** (2008) 189 [arXiv:0801.4852 gr-qc].
12. E. Barausse and T. P. Sotiriou,  
“Perturbed Kerr Black Holes can probe deviations from General Relativity”,  
Phys. Rev. Lett. **101** (2008) 099001 [arXiv:0803.3433 gr-qc].
13. E. Barausse and L. Rezzolla,  
“Predicting the direction of the final spin from the coalescence of two black holes”,  
Astrophys. J. Lett. **704** (2009) L40-L44 [arXiv:0904.2577 gr-qc].
14. M. Cook, C. Evoli, E. Barausse, G. L. Granato and A. Lapi,  
“Two phase galaxy formation: The Gas Content of Normal Galaxies”,  
Mon. Not. Roy. Astron. Soc. **402** (2010) 941 [arXiv:0906.4115 astro-ph.GA].
15. M. Cook, E. Barausse, C. Evoli, G. L. Granato and A. Lapi,  
“Two phase galaxy formation: The evolutionary properties of galaxies”,  
Mon. Not. Roy. Astron. Soc. **402** (2010) 2113 [arXiv:0910.3910].
16. E. Barausse, E. Racine and A. Buonanno,  
“Hamiltonian of a spinning test-particle in curved spacetime”,  
Phys. Rev. D **80** (2009) 104025 [arXiv:0907.4745 gr-qc].
17. E. Barausse,  
“The importance of precession in modelling the direction of the final spin from a black-hole merger”,  
J. Phys. Conf. Ser. **228** (2010) 012050 [arXiv:0911.1274 gr-qc].
18. E. Barausse and A. Buonanno,  
“An improved effective-one-body Hamiltonian for spinning black-hole binaries”,  
Phys. Rev. D **81** (2010) 084024 [arXiv:0912.3517 gr-qc].
19. P. Pani, E. Barausse, E. Berti and V. Cardoso,  
“Gravitational instabilities of superspinars”,  
Phys. Rev. D **82** (2010) 044009 [arXiv:1006.1863 gr-qc].
20. E. Barausse, V. Cardoso and G. Khanna,  
“Test bodies and naked singularities: is the self-force the cosmic censor?”,  
Phys. Rev. Lett. **105** (2010) 261102 [arXiv:1008.5159 [gr-qc]].

21. N. Yunes, A. Buonanno, S. A. Hughes, Y. Pan, E. Barausse, M. C. Miller, and W. Thrope,  
"Extreme Mass Ratio Inspirals within the Effective-One-Body Approach: Quasi-Circular, Equatorial  
Orbits around a Spinning Black Hole"  
Phys. Rev. D **83** (2011) 044044 [arXiv:1009.6013 [gr-qc]].
22. C. Bambi and E. Barausse,  
"Constraining the quadrupole moment of stellar-mass black-hole candidates with the continuum  
fitting method",  
Astrophys. J. **731** (2011) 121 [arXiv:1012.2007 [gr-qc]].
23. E. Barausse, T. Jacobson and T. P. Sotiriou,  
"Black holes in Einstein-aether and Horava-Lifshitz gravity",  
Phys. Rev. D **83**, 124043 (2011) [arXiv:1104.2889 [gr-qc]].
24. E. Barausse, V. Cardoso and G. Khanna,  
"Testing the Cosmic Censorship Conjecture with point particles: the effect of radiation reaction and  
the self-force",  
submitted to Phys. Rev. D [arXiv:1106.1692 [gr-qc]].
25. E. Barausse and A. Buonanno,  
"Extending the effective-one-body Hamiltonian of black-hole binaries to include next-to-next-to-  
leading spin-orbit couplings",  
submitted to Phys. Rev. D [arXiv:1107.2904 [gr-qc]].
26. C. Bambi and E. Barausse,  
"The final stages of accretion onto non-Kerr compact objects",  
submitted to Phys. Rev. D [arXiv:1108.4740 [gr-qc]].

## Seminars and participation in conferences

- Capra meeting, Southampton (UK), July 5, 2011.  
Talk title "Test bodies and naked singularities: is the self-force the cosmic censor?"
- Gravity Theory Seminar at the University of Maryland, April 13, 2011.  
Title "Test bodies and naked singularities: is the self-force the cosmic censor?"
- Seminar at the Institut d'Astrophysique de Paris, April 6, 2011.  
Title "Test bodies and naked singularities: is the self-force the cosmic censor?"
- IPMU Workshop on Black Holes, Kashiwa, Japan, 21 - 25 February 2011.  
Title "Test bodies and naked singularities: is the self-force the cosmic censor?"
- Capra-NRDA, Perimeter Institute, Waterloo, Canada, June 26, 2010.  
Talk title "A new effective-one-body model for spinning black-hole binaries"
- Seminar at the Astronomy Department, University of Maryland, June 14, 2010.  
Title "Gravitational instabilities of superspinars"
- Seminar at the Institute for the Physics and Mathematics of the Universe (IPMU), Kashiwa, Japan,  
May 28, 2010.  
Title "Understanding black-hole binaries: a phenomenological approach"
- Physics colloquium at the University of Mississippi, Oxford, MS, April 6, 2010.  
Title "Hamiltonian of a spinning test-particle in curved spacetime"

- “April” APS Meeting, Washington DC, February 14, 2010.  
Talk title “Hamiltonian of a spinning test-particle in curved spacetime”
- Astrophysics seminar at the University of Tuebingen, Germany, January 14, 2010.  
Title “Understanding black-hole binaries: a phenomenological approach”
- Gravity Theory Seminar at the University of Maryland, November 16, 2009.  
Title “Hamiltonian of a spinning test-particle in curved spacetime”
- 8th Amaldi Conference on Gravitational Waves, June 21-26, 2009, New York (USA).  
Talk title “Predicting the final spin from the coalescence of two black holes”
- LISA Astro-GR at Como-Milano, 6-8 February 2008, Como (Italy).  
Talk title “Can we see an accretion torus with EMRIs?”
- Seminar at the Relativity Group at the University of Southampton (United Kingdom), 15 November 2007.  
Title “The effect of the hydrodynamic drag from an accretion torus on extreme mass-ratio inspirals”
- 30th Spanish relativity Meeting, 10 - 14 September 2007, Tenerife (Spain).  
Talk title “A no-go theorem for polytropic spheres in Palatini  $f(R)$  gravity”
- 18th International Conference on General Relativity & Gravitation and 7th Edoardo Amaldi Conference on Gravitational Waves, 8 - 14 July 2007, Sydney (Australia).  
Talk title “A no-go theorem for polytropic spheres in Palatini  $f(R)$  gravity”
- 13th Conference on present problems in theoretical physics, 30 March - 4 April 2007, Vietri Sul Mare (Italy).  
Talk title “Extreme mass ratio inspirals in non-Kerr spacetimes”
- LISA Astro-GR at the Albert Einstein Institute, 18 - 22 September 2007, Potsdam (Germany).  
Talk title “Extreme mass ratio inspirals in non-Kerr spacetimes”
- 6th International LISA Symposium, 19 - 23 June 2006, Greenbelt (USA).  
Poster title “Extreme mass ratio inspirals in non-Kerr spacetimes”
- Seminar at the Numerical Relativity Group at the Albert Einstein Institute, 3 February 2006, Potsdam (Germany).  
Title “Extreme Mass Ratio Inspirals in Quasi-Kerr Spacetimes”
- 8th Capra Meeting on radiation reaction, 11 - 14 July 2005, Abingdon (United Kingdom).
- ICTP Summer School on Particle Physics, 13 - 24 June 2005, Trieste (Italy).
- Italian National School of Astrophysics (7th cycle, 4th course) on Cosmology - Extrasolar planets, 5 - 11 September 2004, Asiago (Italy).

## Journal refereeing

- Physical Review D
- Physical Review Letters
- Classical and Quantum Gravity
- Monthly Notices of the Royal Astronomical Society

- Astrophysical Journal
- Journal of Cosmology and Astroparticle Physics

## Programming and Numerical Skills

- Programming languages: Fortran 90, some C and C++
- Parallel programming (MPI, openMPI)
- Matlab, Mathematica
- Basic numerical techniques
- HTML, shell scripting

## References

- Prof. Alessandra Buonanno  
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- Prof. Sabino Matarrese  
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