

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 University, USA and ICRANet);

Outside ICRANet

Scientific collaboration with:

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

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

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

Other

I'm currently doing referee activity for a large number of international journals in the field of General Relativity and I'm a reviewer for Mathreview.

For the years 2002-2004 I have been the leader of a collaboration project between the Italian Research Council (CNR) and the analogous institution in Venezuela. Title of the project: *Construction of 3d numerical models for the study of magnetohydrodynamics in gravitational physics and astrophysics*.

For the years 2007-2008 I have been the leader of young researchers projects of INDAM (Istituto Nazionale di Alta Matematica). Title of the project: *Light coordinates and spacetime topography*.

For the years 2008-2009 I have been the leader of young researchers projects of INDAM (Istituto Nazionale di Alta Matematica). Title of the project: *Sistemi di Posizionamento Globale relativistici*

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].