Rossella Gamba

Curriculum Vitae

Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena
Fröbelstieg 1, 07743 Jena, Germany
rossella.gamba@uni-jena.de

PRINCIPAL INTERESTS

Gravitational Wave Astronomy and Data Analysis, Effective-One-Body waveform models, Neutron Star Equation of State.

EXPERIENCE

Graduate Student in Gravitational Wave Astronomy 2019 – Present
Friedrich-Schiller-Universität Jena, Jena, DE
Advisor: Prof. Dr. Sebastiano Bernuzzi.

- First model for binary neutron star coalescences on generic orbits
- First model for gravitational waves from precessing quasi-circular coalescences of binary neutron stars with subdominant modes [13, 5];
- Development and application to GW190521 of the first inspiral-merger-ringdown model for dynamically captured compact objects [12, 6];
- Application EOB models for eccentric binary balck hole coalescences to parameter estimation with LIGO-Virgo data [2];
- Assessment of the impact of waveform systematics on the parameter estimation of gravitational waves signals from binary neutron stars, focusing on both for current and future detectors [14];
- Development and maintenance of the `TEOBResumS` public code.

EDUCATION

Ph.D. Theoretical Physics 2019 – Present
Friedrich-Schiller-Universität Jena, Jena, DE
Dissertation title: TBD
Advisor: Prof. Dr. Sebastiano Bernuzzi.

M.Sc. Theoretical Physics 2017 – 2019
Università di Torino, Torino, IT
Dissertation title: Systematics in gravitational-wave binary neutron stars data analysis.
Grade: 110/110 cum laude
Advisors: Dr. Alessandro Nagar, Prof. Dr. Jocelyn Read.

B.Sc. Physics 2015 – 2017
Università di Torino, Torino, IT
Dissertation title: On the asymptotic behaviour of likelihood ratio test statistics.
Grade: 110/110 cum laude
Advisors: Prof. Dr. Giovanni Trinchero, Prof. Dr. Jan Conrad

POSITIONS HELD

PhD candidate Friedrich-Schiller-Universität Jena, 2019 – Present
Modelling of gravitational waves from binary black holes and binary neutron stars with effective-one-body models.

Erasmus Scholar Friedrich-Schiller-Universität Jena, 2019
Systematic biases in the analysis of gravitational wave data of binary neutron stars.

INFN-NSF/LIGO Summer Student GWPAC, CSUF, 2018
Effects of the low-density equation of state on tidal effects

Erasmus Scholar Stockholm University, 2017
Statistical tests for direct detection of WIMPs with XENON1T.

TEACHING

Advanced Quantum Mechanics tutorials 2020 – Present
Tutorials for the graduate-level Advanced Quantum Mechanics class held by Prof. Dr. Sebastiano Bernuzzi.

Tutor for Projektpraktikum 2020 – 2022
Tutor for the computational "Projektpraktikum" class on numerical solutions of the one-dimensional wave equation.

STUDENT SUPERVISION

2. Alejandra Gonzalez, *EOB models for BHNS coalescences*, M.Sc. thesis, 10/2020
1. Jacopo Tissino, *Machine Learning for Gravitational Waves*, M.Sc. thesis, 10/2021

SEMINARS AND INVITED TALKS

1. UB, 2022: invited talk on "TEOBResumS, an advanced waveform model for O4";
2. UIUC, 2022: seminar on "Modeling gravitational waves from binary neutron stars";
3. PSU, 2022: seminar on "Gravitational waves from binary neutron stars";
4. PAX VIII, 2022: invited panelist for the Waveform Modeling session;
5. PHAROS, 2022: invited talk on "Gravitational waves from binary neutron stars";
6. DPG, 2022: short talk on the interpretation of GW190521 as a dynamical capture;
7. UCAM, 2021: invited seminar on the interpretation of GW190521 as a dynamical capture;
8. IPAM, 2021: invited lecture on Waveform systematics for binary neutron star signals;
9. Rome, 2020: invited seminar on Waveform systematics for binary neutron star signals;
10. Dublin, 2020: invited seminar on Waveform systematics for binary neutron star signals;
11. H2020, 2020: invited talk on the impact of the crust equation of state on the analysis of GW170817 and waveform systematics;

OTHER ACTIVITIES

Member of: the Virgo Scientific Collaboration (VSC), the German Physical Society (DPG);
External Referee for Phys. Rev. D, Particles

PUBLICATIONS LIST List of papers I authored (or co-authored) with less than 10 collaborators. See also my INSPIRE-HEP page for a full list.

[1] **Gamba, Rossella** and Sebastiano Bernuzzi. Resonant tides in binary neutron star mergers: analytical-numerical relativity study. 7 2022.

[2] Alice Bonino, **Gamba, Rossella**, Patricia Schmidt, Alessandro Nagar, Geraint Pratten, Matteo Breschi, Piero Rettegno, and Sebastiano Bernuzzi. Inferring eccentricity evolution from observations of coalescing binary black holes. 7 2022.

[3] Matteo Breschi, **Gamba, Rossella**, Ssohrab Borhanian, Gregorio Carullo, and Sebastiano Bernuzzi. Kilohertz Gravitational Waves from Binary Neutron Star Mergers: Inference of Postmerger Signals with the Einstein Telescope. 5 2022.

[4] Angelica Albertini, Alessandro Nagar, Piero Rettegno, Simone Albanesi, and **Gamba, Rossella**. Waveforms and fluxes: Towards a self-consistent effective one body waveform model for nonprecessing, coalescing black-hole binaries for third generation detectors. 11 2021.

[5] **Gamba, Rossella**, Sarp Akçay, Sebastiano Bernuzzi, and Jake Williams. Effective-one-body waveforms for precessing coalescing compact binaries with post-Newtonian Twist. 11 2021.

[6] **Gamba, Rossella**, Matteo Breschi, Gregorio Carullo, Piero Rettegno, Simone Albanesi, Sebastiano Bernuzzi, and Alessandro Nagar. GW190521: A dynamical capture of two black holes. *Submitted to Nature Astronomy*, 6 2021.

[7] Gunnar Riemenschneider, Piero Rettegno, Matteo Breschi, Angelica Albertini, **Gamba, Rossella**, Sebastiano Bernuzzi, and Alessandro Nagar. TEOBResumS: assessment of consistent next-to-quasicircular corrections and post-adiabatic approximation in multipolar binary black holes waveforms. *Accepted to Phys. Rev. D*, 4 2021.

[8] Matteo Breschi, **Gamba, Rossella**, and Sebastiano Bernuzzi. Bayesian inference of multimessenger astrophysical data: Methods and applications to gravitational waves. *Phys. Rev. D*, 104(4):042001, 2021.

[9] Daniel A. Godzieba, **Gamba, Rossella**, David Radice, and Sebastiano Bernuzzi. Updated universal relations for tidal deformabilities of neutron stars from phenomenological equations of state. *Phys. Rev. D*, 103(6):063036, 2021.

[10] **Gamba, Rossella**, Sebastiano Bernuzzi, and Alessandro Nagar. Fast, faithful, frequency-domain effective-one-body waveforms for compact binary coalescences. *Phys. Rev. D*, 104(8):084058, 2021.

[11] Stefano Schmidt, Matteo Breschi, **Gamba, Rossella**, Giulia Pagano, Piero Rettegno, Gunnar Riemenschneider, Sebastiano Bernuzzi, Alessandro Nagar, and Walter Del Pozzo. Machine Learning Gravitational Waves from Binary Black Hole Mergers. *Phys. Rev. D*, 103(4):043020, 2021.

[12] Alessandro Nagar, Piero Rettegno, **Gamba, Rossella**, and Sebastiano Bernuzzi. Effective-one-body waveforms from dynamical captures in black hole binaries. *Phys. Rev. D*, 103(6):064013, 2021.

[13] Sarp Akcay, **Gamba, Rossella**, and Sebastiano Bernuzzi. Hybrid post-Newtonian effective-one-body scheme for spin-precessing compact-binary waveforms up to merger. *Phys. Rev. D*, 103(2):024014, 2021.

[14] **Gamba, Rossella**, Matteo Breschi, Sebastiano Bernuzzi, Michalis Agathos, and Alessandro Nagar. Waveform systematics in the gravitational-wave inference of tidal parameters and equation of state from binary neutron star signals. *Phys. Rev. D*, 103(12):124015, 2021.

[15] Alessandro Nagar, Geraint Pratten, Gunnar Riemenschneider, and **Gamba, Rossella**. Multipolar effective one body model for nonspinning black hole binaries. *Phys. Rev. D*, 101(2):024041, 2020.

[16] **Gamba, Rossella**, Jocelyn S. Read, and Leslie E. Wade. The impact of the crust equation of state on the analysis of GW170817. *Class. Quant. Grav.*, 37(2):025008, 2020.