

- RESEARCH EXPERIENCE    **September 2022 - August 2024,**  
INFN research fellow in Torino (Italy).  
Research topic: *Modelization of gravitational waves from eccentric binaries detectable by the Einstein Telescope.*  
Group leader: Alessandro Nagar.
- May-August 2022,**  
Visiting researcher at the University of Birmingham (UK).  
Scientific collaboration with Patricia Schmidt.  
Visit funded by the Angelo Della Riccia foundation.
- Frequent visitor (around 8 months total) 2019/23,**  
Invited researcher at the IHES in Bures-sur-Yvette (France).  
Scientific collaboration with Thibault Damour.
- EDUCATION                **May 2022, Ph.D.** (Physics)  
                                  Università degli Studi di Torino, Italy  
                                  Thesis topic: *Gravitational wave modeling using the EOB approach*  
                                  Supervisors: Alessandro Nagar, Nicolao Fornengo
- October 2018, M.Sc.** (Physics)  
                                  Università degli Studi di Torino, Italy, *110/110 magna cum laude*  
                                  Thesis Topic: *Post-adiabatic approximation to the EOB dynamics*  
                                  Advisors: Alessandro Nagar, Nicolao Fornengo
- October 2015, B.Sc.** (Physics)  
                                  Università degli Studi di Torino, Italy, *110/110 magna cum laude*  
                                  Thesis Topic: *PDEs with multiple time dimensions*  
                                  Advisor: Igor Pesando

RESEARCH  
ACTIVITY

My main research concerns the modeling of gravitational waves (GWs) generated by compact binary coalescence. In particular, **I study semi-analytical models based on the effective-one-body (EOB) approach** to the general relativistic two-body problem and their completion through Numerical Relativity (NR) information. **I firsthand contribute to the improvement of one such EOB-NR model, TEOBResumS**, whose first iteration was proposed by Thibault Damour and Alessandro Nagar (the public repository can be found *here*). This model is utilized by the LIGO-Virgo-KAGRA (LVK) collaboration to analyse GW signals.

**I was the first to generalize the post-adiabatic (PA) approximation and apply it to the EOB inspiral**, which greatly reduces the waveform generation time of EOB-NR models. I am also first author of the only paper in literature that compares and contrasts the Hamiltonian differences between different EOB-NR models.

**I also contributed to the extension of TEOBResumS to eccentric and hyperbolic orbits.** These modifications are a step toward the use of TEOBResumS to analyse GW signals generated by non-circularized binaries that will be observed by the third generation of GW detectors and could shed more light on the black hole formation and evolution channels. A first example was the interpretation and analysis of the peculiar GW190521 event as a dynamical capture of two black holes.

Recently, I started focusing on the study of black hole scattering through the use of the Post-Minkowskian (PM) framework. **In collaboration with Thibault Damour, we proposed a novel way of including PM terms in EOB models** that greatly improves the agreement between analytical PM results with NR data.

Finally, being a member of the LVK collaboration, I am also a reviewer for the implementation of GW models in the LIGO Algorithm Library and serve as a ROTA member to do offline analyses of detected GW signals.

RESEARCH  
INTERESTS

Besides continuing my work as a GW model developer, I am trying to explore complementary areas of GW science, such as General Relativity testing and Post-Minkowskian computations.

MEMBERSHIPS

Member of the LIGO-Virgo-KAGRA collaboration (Prometeo group, Virgo).  
Member of the [Einstein Telescope](#) collaboration.

- SCIENTIFIC SPEAKER
- “TPI seminar”, Theoretisch-Physikalisches Institut, Jena (Germany), 12 June 2024
  - “SISSA seminar”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy), 5 October 2023
  - “SXS Webinar”, California Institute of Technology, online, 23 January 2023
  - “Virgo week”, *European gravitational observatory*, online, 25-26 January 2021
  - Astrophysical and Cosmological Relativity Seminars, *Albert Einstein Institute*, online, 9 December 2020
  - Applied and Computational Mathematics Seminars, *University College Dublin*, online, 14 October 2020
  - “Virgo week”, *European gravitational observatory*, Cascina (Italy), 27-28 January 2020

- MASTER/PHD STUDENTS TUTORING
- Lorenzo Turco
  - Tamanna Jain

OTHER ACTIVITIES

Referee for Physical Review journals.

Public speaker during public outreach events, such as the “European Researcher Night”.

- PROGRAMMING LANGUAGES AND SOFTWARE
- C/C++
  - Python
  - Mathematica
  - MATLAB

- LANGUAGES
- Italian (native)
  - English (fluent)
  - French (conversant)