

Cecilia Sgalletta

Curriculum Vitae

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Education

- September – December 2024 **Scientific collaboration**, Institut für Theoretische Astrophysik, Heidelberg, Germany
Collaboration with Prof. Michela Mapelli
- November 2023 – January 2024 **Scientific collaboration**, Institut für Theoretische Astrophysik, Heidelberg, Germany
Supervision of: Prof. Michela Mapelli
During my visit I implemented an emulator to improve the sampling efficiency of the parameter space within SEVN, a fast and versatile binary population synthesis code. Moreover, I investigated the merger rate density of binary black holes across cosmic time, which led to Sgalletta et al. 2024.
- 2021 – now **PhD in Astrophysics and cosmology**, SISSA, Trieste, Italy
Supervisor: Prof. Mario Spera
Cosupervisors: Prof. Andrea Lapi and Prof. Michela Mapelli
Throughout my PhD, I've worked on several projects related to the study of binary evolution processes and the formation of binary compact object systems, with a special focus on binary neutron star systems (Sgalletta et al. 2023, Sgalletta et al. in prep.).
- 2019 – 2021 **Master's degree in Physics of the fundamental interactions**, University of Padova, Padova, Italy, 110/110 with honors
I graduated on October 26, 2021, with 110/110 with honors, with a master thesis entitled "**Binary neutron star populations in the Milky Way**", with supervisor Prof. Michela Mapelli and co-supervisors Dr. Maria Celeste Artale and Dr. Giuliano Iorio.
- Summer 2020 **Summer internship**, University of Padova, Padova, Italy
Supervisor: Prof. Michela Mapelli
I have worked on a theoretical-computational project investigating the formation channels of binary compact objects, in particular focusing on binary systems of neutron stars.
- 2016 – 2019 **Bachelor's degree in Physics**, University of Padova, Padova, Italy, 104/110
I graduated in Physics at the University of Padova on 24 September 2019, with a thesis entitled "**Modelli unificati di materia ed energia oscura**" ("Unified models of dark matter and dark energy"), with supervisor prof. Sabino Matarrese, and co-supervisor Dr. Daniele Bertacca.
- 2011 - 2016 **Scientific High School**, "Carlo Urbani", Montegiorgio (FM), Italy, 100/100
- 2010 - 2016 **Conservatory**, "G.B. Pergolesi", Fermo, Italy
I studied cello at conservatory G.B. Pergolesi in Fermo

Talks and summer schools

I presented my research activities in several conferences, among which **two invited talks and a review talk**.

- 29 September – **Riding the waves into the future, TUTT2024**, Valona, Albania
 04 October 2024 Invited review talk "Population models and rates" on what we already know about the population of gravitational wave sources and the present challenges in binary population synthesis codes.
- 15 – 19 July 2024 **41st Liège International Astrophysical Colloquium: The eventful life of massive star multiples**, Liège, Belgium
 Talk on the "Binary neutron star populations in the Milky Way".
- 10 – 14 June 2024 **360º Approach to Common Envelope Evolution**, Barcelona, Spain
 Workshop by invitation only, centered on the unsolved problems of the common envelope evolution. Presentation of the poster "Challenges for binary population synthesis: towards a better modelling of the common envelope".
- 29 April – 03 May 2024 **Gravitational waves: a new ear on the chemistry of galaxies**, Leiden, The Netherlands
 Workshop at the intersection of gravitational-wave astrophysics and galactic chemical evolution.
- 04 – 06 December 2023 **Forging a New Synthesis Between Supernova Theory and Observation**, Princeton
 Workshop by invitation only, on the supernova explosion physics.
- 18 October 2023 **Invited seminar**, University of Padova, Padova, Italy
 Invited seminar on "Modeling the population of Galactic binary neutron stars", focused on the pivotal role of binary neutron stars in modern astrophysics and their multimessenger nature.
- 04 – 06 October 2023 **The Fourth Gravi-Gamma-Nu Workshop**, GSSI, L'Aquila, Italy
 Talk about "Binary Neutron Star populations in the Milky Way"
- 10 – 14 July 2023 **Gravitational-wave populations: what's next?**, BICOCCA University, Milano, Italy
 Short talk about "Binary Neutron Star populations in the Milky Way"
- 05 – 09 September 2022 **Amaldi Research Center Summer School**, Paestum, Italy
 Summer school on gravitational physics and astrophysics
- 25 – 29 July 2022 **The ONASSIS foundation science lecture series 2022 in physics**, Heraklion, Crete
 Fully funded summer school on gravitational wave theory, analysis and detectors.
- 21 – 22 July 2022 **TEONGRAV annual meeting**, Florence, Italy
 Invited talk about "Modeling the population of Galactic binary neutron stars"
- 06 – 09 April 2022 **Spring workshop of physics of data**, University of Padova, Venice, Italy
 Invited talk about "Pulsars spin-up: a semi-analytical approach"

Referee experience

Referee for the Astrophysical Journal

Referee for the Monthly Notices of Royal Astronomical Society

Organization of conferences

- Member of the LOC of "Cosmology 2023 in Miramare", Trieste, Italy, August 28 – September 02 2023

Memberships

- 2022 – now **Member of the Einstein Telescope (ET) Research Unit in SISSA**
 - ET is the European next-generation ground-based gravitational-wave detector.
 - I will study in particular the formation and evolution of binary compact object systems as possible gravitational-wave sources.

- 2022 – now **Member of the LISA collaboration**
- LISA is a space-based gravitational wave observatory.
- 2022 – now **Member of the TEONGRAV Trieste group**
- TEONGRAV is a national INFN project, with the purpose of modelling gravitational wave sources, such as binary systems of neutron stars and black holes.
- 2021 – now **Member of the Observation Science Board of the Einstein Telescope**
- The Observation Science Board's goal is to identify the main scientific cases for the ET, to write the first Blue Book of ET and to organize a broad scientific community for the exploitation of ET.

Outreach

- September 2022 **TriesteNEXT**
- 23 – 25 2022 ○ TriesteNEXT is a festival aimed at promoting innovation and scientific research, held every year in Trieste
- I actively participated at the event by organizing an astrophysics-themed crossword for children and writing an outreach story titled "Alla ricerca di Gravità" ("In search of Gravity").
- 06 – 09 April 2022 **Spring workshop of physics of data**, University of Padova, Venice, Italy
- I gave a talk to the students in physics of data of the University of Padova, with a focus on the computational challenges of my work on pulsars' evolution.

Programming languages

- Python (excellent), C++ (good), sh/bash (good), HTML.

Languages

- Italian (mothertongue), english (fluent), french (basic)

List of publications

In the list below, publications where I am the main author are marked with an asterisk.

- [1] * **Cecilia Sgalletta**, Giuliano Iorio, Michela Mapelli, Maria C. Artale, Lumen Boco, Debatri Chattopadhyay, Andrea Lapi, Andrea Possenti, Stefano Rinaldi and Mario Spera. *Binary neutron star populations in the Milky Way*. 526(2):2210–2229, Dec. 2023. DOI: 10.1093/mnras/stad2768.
- [2] * **Cecilia Sgalletta**, Michela Mapelli, Lumen Boco, Filippo Santoliquido, Maria C. Artale, Giuliano Iorio, Andrea Lapi and Mario Spera. *The more accurately we model the metal-dependent star formation rate, the larger the predicted excess of binary black hole mergers*. arXiv e-prints, art. arXiv:2410.21401, Oct. 2024. DOI: 10.48550/arXiv.2410.21401.
- [3] Rosalba Perna, Maria C. Artale, Yi-Han Wang, Michela Mapelli, Davide Lazzati, **Cecilia Sgalletta**, Filippo Santoliquido. *Host galaxies and electromagnetic counterparts to binary neutron star mergers across the cosmic time: detectability of GW170817-like events*. 512(2):2654–2668, May 2022. DOI: 10.1093/mnras/stac685.
- [4] Giuliano Iorio, Michela Mapelli, Guglielmo Costa, Mario Spera, Gaston J. Escobar, **Cecilia Sgalletta**, Alessandro A. Trani, Erika Korb, Filippo Santoliquido, Marco Dall'Amico, Nicola Gaspari and Alessandro Bressan. *Compact object mergers: exploring uncertainties from stellar and binary evolution with SEVN*. 524(1):426–470, Sept. 2023. DOI:10.1093/mnras/stad1630.

- [5] Ruggero Valli, Luca Graziani and the **LISA Synthetic UCB Catalogue Group**. *BinCodex: a common output format for binary population synthesis*. arXiv e-prints, art. arXiv:2311.03431, Nov. 2023. doi:10.48550/arXiv.2311.03431
- [6] Giuliano Iorio, Stefano Torniamenti, Michela Mapelli, Marco Dall'Amico, Alessandro A. Trani, Sara Rastello, **Cecilia Sgalletta**, Stefano Rinaldi, Guglielmo Costa, B. A. Dahl-Lahtinen, Gaston J. Escobar, Erika Korb, Maria P. Vaccaro, Elena Lacchin, Benedetta Mestichelli, Ugo N. Di Carlo, Mario Spera and Manuel Arca Sedda. *The boring history of Gaia BH3 from isolated binary evolution*. 690:A144, Oct. 2024. DOI: 10.1051/0004-6361/202450531.
- [7] Francesco Gabrielli, Andrea Lapi, Lumen Boco, Cristiano Ugolini, Guglielmo Costa, **Cecilia Sgalletta**, Kendall Shepherd, Ugo N. Di Carlo, Alessandro Bressan, Marco Limongi and Mario Spera. *The cosmic rate of pair-instability supernovae*. 534(1):151–172, Oct. 2024. DOI:10.1093/mnras/stae2048.