Erika **Korb**

PhD candidate in Astrophysics | University of Padua

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Education

Ongoing – Oct 2022 | **PhD candidate in Astrophysics**, **University of Padua**
Thesis: *Binary compact object populations*
Supervisor: Prof. Michela Mapelli

- I study the correlation between stellar structure and mass transfer efficiency, simulating stellar and binary processes with the stellar evolution software MESA. I aim to extract fitting-formulae and tables that can be implemented by population-synthesis codes, allowing for more realistic simulations, and contributing to the science case for Einstein Telescope.

MESA Einstein Telescope

Sep 2022 – Oct 2020 | **Master in Astrophysics and Cosmology**, **University of Padua**
Thesis: *Wolf-Rayet – black hole binaries as progenitors of binary black holes*
Supervisor: Prof. Michela Mapelli; Co-Supervisor: Dr. Giuliano Iorio
Grade: 110/110 cum laude

- I studied binaries hosting a Wolf-Rayet star and a black hole, investigating their role as progenitors of merging binary black holes. I evolved the systems with the population synthesis-code SEVN, and compared my results to the observed properties of Cyg X-3.

SEVN Thesis PDF erikakorb/masterthesis

Sep 2020 – Oct 2017 | **Bachelor in Astronomy**, **University of Padua**
Thesis: *Impact of mass transfer efficiency on the formation of binary compact objects*
Supervisor: Prof. Michela Mapelli; Co-Supervisor: Dr. Giuliano Iorio
Grade: 110/110 cum laude

- I studied the impact of mass transfer processes on the formation of binary compact objects. I focused my analysis on the binaries merging via gravitational wave emission, generating mock populations by means of numerical simulations with the SEVN code.

SEVN Thesis PDF

Jul 2017 – Sep 2012 | **Scientific High School Diploma**, **Liceo "Benedetti-Tommaseo", Venice**
Final project: *The Pleiades*
Grade: 100/100 cum laude

- I calculated the distance of the Pleiades open cluster with the parallax method.

Awards and Prizes

2023 | **Geppina Coppola Prize** by the **Geppina Coppola Association, INAF-OACN** Website

- I was awarded for the best master thesis in astronomy in Italy (among $\gtrsim$ 40 candidates). The prize included 1500 € and an invitation to Naples to give two talks about my work.

2020 | **Mille e una lode** by the **University of Padua** Website

- I was in the 3% of students with the highest average grade in my bachelor. For this, I received a 1000 € scholarship for a 250 hours internship; I included it in my master thesis work.

2016, 2015 | **Il cielo come laboratorio** by the **University of Padua** Website

- I was selected (23% of candidates, regional selection) for a three-days stage at the Asiago observatory (Italy) to analyze photometric and spectroscopic data in teams of 2-3 people.

Publications accepted

Co-author | **Compact object mergers: exploring uncertainties from stellar and binary evolution with SEVN**
Giuliano Iorio, Michela Mapelli, Guglielmo Costa, Mario Spera, Gastón J. Escobar, Cecilia Sgalletta, Alessandro A. Trani, **Erika Korb**, Filippo Santoliquido, Marco Dall'Amico, Nicola Gaspari, Alessandro Bressan *2023, MNRAS, 524, 426*
ui.adsabs.harvard.edu/abs/2023MNRAS.524..426I/abstract gitlab.com/sevncodes/sevn

Conferences & Talks

10 Nov 2023 | **Astromeeting INAF-OACN ("Geppina Coppola" prize)** Youtube
INAF Osservatorio Astronomico di Capodimonte, Naples — Invited talk

26-30 Jun 2023 | **The Renaissance of Stellar Black-Hole Detections in The Local Group** Website
Lorentz Center, Leiden — Talk (partecipation only upon invitation)

21-22 Apr 2023 | **Spring Workshop on Physics of Data** Website
AI Society - University of Padua, Venice — Invited talk

4-5 Aug 2022 | **Post-PAX meeting**
Harvard–Smithsonian Center for Astrophysics, Boston — Poster presentation (online)

Schools

28 Aug-1 Sep 2023 | **MESA Summer School 2023, Konkoly Observatory, Budapest** Website
- I improved my knowledge of the MESA stellar evolution software.
- Teachers: J. Klencki, J. Tayar, L. Bugnet, M. G. Pedersen, M. Joyce, R. Smolec

3-7 Oct 2022 | **3rd Astrostatistics School, INAF Brera, Milan** Website
- I used the JAGS software to apply Bayesian statistics in the astrophysical context.
- Teacher: S. Andreon

Memberships & Collaborations

Mar - Apr 2024 | **Visiting student** at Institute for Theoretical Astrophysics (ITA) - **University of Heidelberg**

2022 - now | **LISA** - Associate member of the Laser Interferometer Space Antenna consortium Website
2022 - now | **ET** - Member of the Einstein Telescope collaboration Website
2022 - now | **TEONGRAV** - Member of the Theory of Gravitational Wave Sources collaboration Website
2022 - now | **INFN** - Affiliated to the Italian Institution for Nuclear Physics; Section of Padua Website
2020 - now | **DEMOBLACK** - Member of the ERC-funded research group led by Michela Mapelli Website

Teaching

Oct-Feb 2023/24 | **Il cielo come laboratorio (astronomy course - outreach project)**
High School "Benedetti-Tommaseo", Venice — Teacher

Apr-Jun 2023 | **Laboratory of Computational Physics (Mod B.)**
University of Padua, Master in Physics of Data — Teaching assistant

Thesis co-supervisor

Master	**Juan Manuel Pacheco Arias** (110/110 cum laude)	2023
	Hydrodynamical simulations of massive stars collisions	Master Thesis
Bachelor	**Alberto Casellato** (ongoing)	2024
	Study on the effect of mass transfer stability on binary black hole properties	

Outreach

Ongoing – Oct 2023 — **Museum guide, Padua** — Website

- I accompany students, families and visitors through the exhibition of scientific instruments hosted at the "Giovanni Poleni" Physics Museum in Padua.

Ongoing – Feb 2024 — **Designing innovative public engagement activities, Padua** — Website

- Among with other PhD students in astronomy of the University of Padua, I am developing outreach projects for the astronomy festival that will be held in June in Castellaro Lagusello (Italy). The projects are aimed to kids and are accessible also to people with disabilities.

Feb 2024 – Oct 2023 — **Teacher for the outreach project "Il cielo come laboratorio", Venice** — Website

- I held an astronomy course at the high school "Benedetti-Tommaseo" in Venice as part of the astronomy outreach project "Il cielo come laboratorio" coordinated by the University of Padua. The project aims to offer university-orientation in scientific subjects to high school students. The course explains at a university-like level topics of quantum mechanics, stellar evolution, galaxy morphology, planetary and exoplanetary characterization, spectroscopic and photometric techniques. In addition, I also organized telescope observation nights with the students. Eventually, 4/30 of the students following my lessons were selected to participate in a 4-days stage at the Asiago observatory (regional selection for 24/255 candidates) where they team-worked to analyze astronomical data, in a researcher-like experience.

10 Nov 2023 — **"Geppina Coppola" prize, INAF-OACN Naples** — Website

- I explained my master thesis work to the general public in the ceremony where I was awarded the "Geppina Coppola" prize for best master thesis in astronomy in Italy.

29 Sep 2023 — **European Researcher's Night - Science4All, Padua** — Website

- I explained my work as a researcher to the general public. I gave a talk (*Olive Ascolane Stellari*) about my research topic and introduced families and kids to the science world.

23,24 Mar 2023 — **Science and mythology of constellations, Venice**

- I gave two lessons at the scientific high school "G.B. Benedetti" in Venice to explain to the students the link between constellation's mythology and astronomical phenomena like Earth's rotation, revolution or axial precession. I used practical and digital tools, bringing spheres, gyroscopes and scripting a plugin in *Stellarium* to automatize the sky visualization throughout centuries and nights.

Jun 2023 – Nov 2022 — **Science from the Islamic world to today's Europe, Padua** — Website

- I contributed to the creation of new outreach projects for the "Giovanni Poleni" Physics Museum of Padua, focusing on the communication of the scientific research and teaching practices brought from the Islamic world to today's Europe. The projects were developed by mixed working-groups, involving PhD students and members of Padua foreign communities.

16 Jul 2019 — **Telescope observations open to the general public, Padua** — Website

- I collaborated with the amateur astronomers of Padua, using their telescopes to illustrate celestial objects in the public event organized for the partial lunar eclipse.

€ Fundings

2021 | **PRIN** (**577.5 k€ for 3 years**)
By: MIUR (Italian Minister for Education, University and Research)
Title: *Multimessenger astronomy in the Einstein Telescope Era (METE)*
PI: Marica Branchesi; co-PIs: Enrico Cappellaro, Michela Mapelli, Michele Punturo
› Success rate: 9.5%. Covers most of my PhD expenses

</> Software skills

Advanced	Python (e.g., *Numpy, Matplotlib, Pandas, Dask, Scipy, RegEx, Streamlit, Altair*; Jupyter, IDLE), LaTeX(TeXstudio, Overleaf), Slurm (Queue scheduler for HPC), Git, Linux, Windows, SEVN (Population-synthesis code), MESA (Stellar evolution software)
Intermediate	Markdown, Bash, Stellarium (scripting plugins for outreach), Inkscape/GIMP (Graphics)
Basic	C++, Fortran90, JAGS (Gibbs sampler), SAOImage DS9, TOPCAT, Olive (video editing)

Languages

	A1	A2	B1	B2	C1	C2	
Italian	●	●	●	●	●	●	(native)
English	●	●	●	●	●	○	
German	●	●	○	○	○	○	