Lavinia Paiella

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Research interests

I am strongly interested in **compact objects** and their **multi-messenger** emissions. I am currently investigating the role of **star clusters** in producing **heavy intermediate-mass black holes** using semi-analytic **population synthesis codes** and their potential detection with current and future **gravitational-wave** interferometers.

Education

Ph.D. program — **Gran Sasso Science Institute**
Astroparticle Physics — *Nov 2022 - Present*
Supervisors: Prof. Manuel Arca Sedda, Prof. Gor Oganesyan
keywords: intermediate mass black holes, star clusters, population codes, gravitational waves

Master Degree — **La Sapienza University**
Astrophysics, 110/110 w.h. — *Sep 2020 - Sep 2022*
keywords: neutron star binaries, gravitational waves, kilonovae

Bachelor Degree — **La Sapienza University**
Physics, 110/110 w.h. — *Sep 2017 - Sep 2020*
keywords: machine learning, galaxy surveys

Awards and Funding

CINECA Computational Resource Allocation (Pleiadi Call 7)
65,000 core hours on LEONARDO-BOOSTER — *April 2026*
Project: "Intermediate-mass black holes secular growth in dense star clusters". N-body simulations of IMBH growth across cosmic time.

Transnational Visitor Programme Grant
Awarded by AHEAD2020, ∼ 2.5k euros — *April 2024*
Grant for short-term visitor programmes aimed at the realization of projects in high energy astrophysics.

Milla Baldo Ceolin National Prize
Awarded by INFN, ∼ 1k euros — *July 2023*
National award for the 10 best master theses in Theoretical Physics written by women.

Scientific visits

Short term stay (AHEAD2020) — **ICCUB**
Barcelona , Spain — *22 Sept - 13 Oct 2024*
Project on the formation of black hole - neutron star binaries and their potential as gamma-ray bursts progenitors. Supervision of Dr. Sara Rastello and Prof. Mark Gieles.

Short term stay **Johns Hopkins University**
Baltimore , USA *25 Oct - 23 Nov 2023*
Hosted by Prof. Emanuele Berti's research group in the context of ITA-USA Bilateral Agreement between GSSI and Johns Hopkins University.

Publications (short-author)

[1]: Arca Sedda M., **Paiella L.**, Ugolini C. *et al.*, *Isolated or Dynamical? Tracing Black Hole Binary Formation through the Population of Gravitational-Wave Sources*, *arXiv preprint* (*under review*), arXiv:2603.20430

[2]: **Paiella L.**, Arca Sedda M., Mestichelli B., Ugolini C., *Seeds to success: growing heavy black holes in dense star clusters*, *arXiv preprint* (*accepted by A&A*), arXiv:2511.00200

[3]: **Paiella, L.**, Ugolini, C., Spera, M., Branchesi, M., and Arca Sedda, M., *Assembling GW231123 in star clusters through the combination of stellar binary evolution and hierarchical mergers*, *ApJL, 2025*, 10.3847/2041-8213/ae1447

[4]: Mestichelli B., Mapelli M., Santoliquido F., Arca Sedda M., Branchesi M., **Paiella L.***et al.*, *Black Hole - Neutron Star and Binary Neutron Star Mergers from Population III and II stars*, *A&A*, 10.1051/0004-6361/202555951

[5]: Toubiana, A., Gerosa, D., Mould, M., Rinaldi, S., Arca Sedda, M., Bruel, T., Buscicchio, R., Gair, J., **Paiella, L.**, *et al.*, *Comparing astrophysical models to gravitational-wave data in the observable space*, *arXiv preprint*, arXiv:2507.13249

[6]: Cozzumbo, A., Mestichelli, B., Mirabile, M., **Paiella, L.**, Tissino, J., and Harms, J., *Opportunities and limits of lunar gravitational-wave detection*, *Phil. Trans. R. Soc. A, 2023*, rsta.2023.0066

Seminars & Talks

Seminars

Teeminars 2026 **Heidelberg University**
Online *27 Jan 2026*

Galaxy Evolution Coffee **ESO**
Garching, Germany *13 Nov 2025*

APC Seminars **SISSA**
Trieste, Italy *19 March 2025*

Pizza Seminars **ICE - CSIC**
Barcelona, Spain *11 Oct 2024*

Invited talks

GRaviCon2026 **Scuola Normale Superiore**
Pisa, Italy *22-24 April 2026*

Contributed talks

BritGrav26 **Cardiff University**
Cardiff, United Kingdom *9-10 Apr 2026*

LISA Astro-WG Meeting **Campus Biotech**
Geneva, Switzerland *15-17 Dec 2025*

EAS 2025 — **University College Cork**
Cork, Ireland — *23-27 June 2025*

MODEST 2025 — **Seoul National University**
Seoul, South Korea — *16-20 June 2025*

ET Symposium 2025 — **CNR center**
Bologna, Italy — *26-30 May 2025*

Unveiling massive black hole evolution with gravitational waves and light — **APC Paris**
Paris, France — *19-23 May 2025*

MODEST 2024 — **Nicolaus Copernicus Astronomical Center**
Warsaw, Poland — *19 -23 Aug 2024*

Short talks

Challenges and future perspectives in GW astronomy — **Lorentz center**
Leiden, Netherlands — *14 -18 Oct 2024*

Outreach

Ricerca Fuori Campo — **Gran Sasso Science Institute**
L'Aquila, Italy — *24 Nov 2025*
Event moderator of public discussion on the representation and role of researchers in society.

European Researchers' Night — **Gran Sasso Science Institute**
L'Aquila, Italy — *26 Sep 2025*
Volunteered at the activities organized by Gran Sasso Science Institute.

Space Explorers — **Gran Sasso Science Institute**
L'Aquila, Italy — *2023 - Present*
Outreach event organized by the Astrophysics and Cosmology Group of Gran Sasso Science Institute for elementary schools in L'Aquila.

European Researchers' Night — **Gran Sasso Science Institute**
L'Aquila, Italy — *29-30 Sep 2023*
Volunteered at the activities organized by Gran Sasso Science Institute.

Technical skills

Programming: Python (advanced), C/C++ (intermediate), Mathematica, Fortran (beginner)

O.S.: Linux, Windows (advanced)

Other: LaTeX, Office (advanced), Matlab (beginner)

Languages

Italian: Native

English: Proficient — *IELTS Certificate, average score: 8 (January 2022)*