

ULYANA DUPLETSA

PhD Candidate in Astroparticle Physics

CONTACT INFO

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ABOUT ME

Theoretical astrophysicist, studying gravitational waves from compact binary systems to probe the universe's expansion history, both with future, such as the Einstein Telescope, and current, the LIGO-Virgo-KAGRA Collaboration gravitational-wave detectors. Research interests include gravitational-wave astronomy, data analysis, and Bayesian statistics.

CURRENT POSITION

PhD in Astroparticle Physics **2020-current**
Gran Sasso Science Institute | L'Aquila, Italy

- Research topic: "Gravitational-wave Cosmology with Compact Binaries"
- Advisor: Jan Harms
- Co-advisors: some projects are co-supervised by Marica Branchesi and Riccardo Murgia

EDUCATION

Master's degree in Theoretical Physics **2017-2019**
University of Milano Bicocca | Milan, Italy

- Thesis title: "Thermodynamic Aspects of AdS_4 Black Holes in $N = 2$ Gauged Supergravity"
- Advisor: Alberto Zaffaroni
- Final degree grade: 110/110 cum Laude

Bachelor's Degree in Physics **2013-2017**
The University of Milano Bicocca | Milan, Italy

- Thesis title: "Supermassive Binary Black Holes and their Dynamics in Galactic Nuclei"
- Advisor: Monica Colpi
- Final degree grade: 110/110 cum Laude

TEACHING EXPERIENCE

Private Tutoring **2012-2020**

- Mentoring of high-school and university students on various subjects mainly in maths and physics

VISITINGS

University of Cagliari

22-26 Apr, 2024

Cagliari, Italy

- Invited seminar on 'ET forecasts on cosmological growth of BH masses'

Johns Hopkins University

Oct-Nov, 2023

Baltimore, United States

- Collaboration with Emanuele Berti's group as part of the exchange program MAECI MUR organized by professor Andrea Maselli

PHD SCHOOLS

Scientific Communication in Astronomy School

2-6 Oct, 2023

Bertinoro, Italy

First EuCapt School in Cosmology

18-22 Sept, 2023

Valencia, Spain

Amaldi Research Center Summer School

5-9 Sept, 2022

Paestum, Italy

The Onassis Foundation Science Lectures in Physics: Gravitational Waves

25-29 Jul, 2022

Heraklion, Crete

PUBLICATIONS

Short Author-List Papers

10. "Validating Prior-informed Fisher-matrix Analyses against GWTC Data"
U. Dupletsa, J. Harms, J. Tissino, F. Santoliquido, A. Cozzumbo; 2024,
[arXiv:2404.16103 \[gr-qc\]](#)

9. "Classifying binary black holes from Population III stars with the Einstein Telescope: a machine-learning approach"
F. Santoliquido, **U. Dupletsa**, J. Tissino, M. Branchesi, F. Iacovelli, G. Iorio,
M. Mapelli, D. Gerosa, J. Harms and M. Pasquato ; 2024, [arXiv:2404.10048 \[astro-ph.HE\]](#)

8. "The Wide-field Spectroscopic Telescope (WST) Science White Paper"
V. Mainieri et al. incl. **U. Dupletsa**; 2024, [arXiv:2403.05398 \[astro-ph.IM\]](#)

7. "Phenomenological models of Cosmic Ray transport in Galaxies"
C. Evoli and **U. Dupletsa**; 2023, in *Proceedings of the International School of Physics "Enrico Fermi"*, Volume 208: Foundations of Cosmic Ray Astrophysics, [arXiv:2309.00298 \[astro-ph.HE\]](#)

6. "Science with the Einstein Telescope: a comparison of different designs"
M. Branchesi, M. Maggiore et al. incl. **U. Dupletsa**; JCAP 07 (2023) 068,
[DOI:10.1088/1475-7516/2023/07/068](#), [arXiv:2303.15923 \[gr-qc\]](#) [[astro-ph.CO](#)] [[astro-ph.HE](#)]

5. "Pre-merger alert to detect the very-high-energy prompt emission from binary neutron-star mergers: Einstein Telescope and Cherenkov Telescope Array synergy",
B. Banerjee, G. Oganesyan, M. Branchesi, **U. Dupletsa**, F. Aharonian, F. Brighenti, B. Goncharov, J. Harms, M. Mapelli, S. Ronchini, F. Santoliquido
Astronomy and Astrophysics, Vol. 678, DOI:10.1051/0004-6361/202345850
arXiv:2212.14007 [astro-ph.HE]

4. "Measuring properties of primordial black hole mergers at cosmological distances: effect of higher order modes in gravitational waves",
K. K. Y. Ng, B. Goncharov, S. Chen, S. Borhanian, **U. Dupletsa**, G. Franciolini,
M. Branchesi, J. Harms, M. Maggiore, A. Riotto, B. S. Sathyaprakash, S. Vitale,
Phys. Rev. D 107, 024041,
DOI:10.1103/PhysRevD.107.024041, arXiv:2210.03132 [astro-ph.HE] [gr-qc]

3. "GWFish: A simulation software to evaluate parameter-estimation capabilities of gravitational-wave detector networks"
U. Dupletsa, J. Harms, B. Banerjee, M. Branchesi, B. Goncharov, A. Maselli,
A. C. S. Oliveira, S. Ronchini, J. Tissino; *Astronomy and Computing* (2023),
DOI:10.1016/j.ascom.2022.100671, arXiv:2205.02499 [gr-qc]
[github link: github.com/janosch314/GWFish]

2. "Perspectives for multi-messenger astronomy with the next generation of gravitational-wave detectors and high-energy satellites",
S. Ronchini, M. Branchesi, G. Oganesyan, B. Banerjee, **U. Dupletsa**, G. Ghirlanda, J. Harms, M. Mapelli, F. Santoliquido; *Astronomy & Astrophysics* (2022), Volume 665, A97, DOI:10.1051/0004-6361/202243705,
arXiv:2108.07276 [astro-ph.HE]

1. "On the single-event-based identification of primordial black hole mergers at cosmological distances",
K. K. Y. Ng, S. Chen, B. Goncharov, **U. Dupletsa**, S. Borhanian, M. Branchesi, J. Harms, M. Maggiore, B. S. Sathyaprakash, S. Vitale; *ApJL* 931 L12 (2022),
DOI 10.3847/2041-8213/ac6bea, arXiv:2108.07276 [gr-qc], [hep-ph]

20+ Collaboration Papers inside the LVK Collaboration [see complete list [here](#)]

SELECTED CONFERENCES & SEMINARS

ModIC 2024 - Model-Independent Cosmology with gravitational waves, large-scale structure, and high-energy surveys 13-17 May, 2024

IFPU Trieste, Italy

- Contributed talk on 'Dark Sirens Cosmology with neutral hydrogen intensity mapping' and hands-on session on GWFish with and without priors

XIV ET Symposium

6-10 May, 2024

Maastricht, Netherlands

- Contributed talk on 'Enhancing Fisher Matrix Results with Physically Motivated Priors'

Linking Advances in our Understanding of Theoretical Astrophysics and Relativity to Observations (LAU-TARO)

17-19 Apr, 2024

Milano-Bicocca, Italy

- Contributed talk on 'Enhancing Fisher Matrix Results with Physically Motivated Priors'

ET: Scienza e Tecnologia in Italia**20-23 Feb, 2024***Assisi, Italy*

- School lecture on 'GWFish: Simulation of gravitational-wave detector networks with Fisher-matrix PE'

LIGO-Virgo-KAGRA Collaboration Meeting**11-14 Sept, 2023***Toyama, Japan*

- **contributed talk:** "Mock Data Challenge - Analysis with icarogw"

Amaldi 15**17-21 Jul, 2023***[online]*

- **contributed talk:** "Forecasting detection and parameter estimation capabilities for different ET designs in a multi-messenger context"

Gravitational-wave populations: what's next? Workshop**10-14 Jul, 2023***Milan, Italy*

- **contributed short talk:** "GWFish - a Fisher Matrix Software"

Gravitational Wave Advanced Detector Workshop**22-26 May, 2023***Isola d'Elba, Italy*

- **invited talk:** "Forecasting the Detection and Parameter Estimation Capabilities for different ET Designs"

XIII ET Symposium**8-12 May, 2023***Cagliari, Italy*

- **invited talk:** "Fisher Information Matrix for ET Forecasts: How Informative is it?"
- organization of tutorial session on "GWFish - a Fisher Matrix Analysis Software"

OSB3 Monthly meeting**14 Mar, 2023***[online]*

- **presentation** on "GWFish - a Fisher Matrix Analysis Software"

OSB9 Monthly meeting**10 Mar, 2023***[online]*

- **presentation** on "Fisher Matrix Analysis - adding Priors"

LIGO-Virgo-KAGRA Collaboration Meeting**12-16 Sep, 2022***Cardiff*

- **poster:** "GWFish - A simulation software to evaluate parameter-estimation capabilities of gravitational-wave detector networks"

MEMBERSHIPS

LIGO-Virgo-KAGRA Collaboration

- **CBC Cosmology Group**

Einstein Telescope Collaboration

- Observational Science Board: **Cosmology**
- Observational Science Board: **Multi-Messenger Astrophysics**
- Observational Science Board: **Common Tools**

SKILLS

Programming languages

- Python (advanced)
- C/C++, Mathematica (intermediate)
- Bash, SQL (basic)

Software and Tools

- \LaTeX
- git

Languages

- Italian (native)
- Ukrainian (native)
- English (advanced)

OUTREACH ACTIVITIES

SHARPER | L'Aquila, Italy

- Yearly participation to the outreach activities of the European Researchers' Night (24 September 2021, 30 September 2022 and 29 September 2023)

PhTea Talks | L'Aquila, Italy

- Co-organizer of informal talks for PhD students
- talk "A Hitchhiker's Guide to hush annoying Flat Earthers" in March 2023
- talk "Sip back and relax: it's tea time!" in April 2024

Premio Asimov | L'Aquila, Italy

- Project organized by prof. Francesco Vissani
- Part of reviewing committee for the years 2021, 2022, 2023, 2024

Scienza in Bidda | Sardinia

- Organized by Riccardo Murgia since 2023
- Part of the outreach project to talk about the relevance of the Einstein Telescope in Sardinia