

Stefano Rinaldi

PH.D. CANDIDATE · GRAVITATIONAL WAVE PHYSICS

Largo Bruno Pontecorvo 3, I-56127 Pisa, Italy

✉ stefano.rinaldi@phd.unipi.it | 🏠 sterinaldi.github.io | 🆔 0000-0001-5799-4155

Education

University of Pisa

PH.D. IN PHYSICS

[Pisa, Italy](#)

Nov 2020 - PRESENT

- Thesis: *Bayesian non-parametric methods for gravitational-wave astrophysics*
- Advisor: Prof. Walter Del Pozzo

University of Pisa

M.Sc. IN PHYSICS WITH HONORS

[Pisa, Italy](#)

Sep 2018 - Jun 18, 2020

- Thesis: *Inference of cosmological parameters from gravitational wave observations*
- Advisor: Prof. Walter Del Pozzo

University of Pisa

B.Sc. IN PHYSICS

[Pisa, Italy](#)

Sep 2015 - Sep 21, 2018

- Thesis: *The Spin-Statistics Theorem*
- Advisor: Prof. Paolo Rossi

Research Interests

Gravitational Waves

GENERAL RELATIVITY, ASTROPHYSICS, COSMOLOGY

- Binary black hole population properties
- Inference of cosmological parameters from gravitational waves
- Lensing of gravitational waves: detection techniques
- Detector sensitivity characterisation

Astrophysics

STATISTICAL AND NUMERICAL METHODS

- Star cluster properties
- Gravitational N-body simulation
- Stellar evolution

Statistics

DATA ANALYSIS, BAYESIAN STATISTICS

- Dirichlet Process and non-parametric methods
- Model selection via non-parametric methods
- Population studies with censored data

Member of the LIGO-Virgo-KAGRA Collaboration

[Virgo Collaboration](#)

COSMOLOGY, RATES & POPULATION TECHNICAL GROUPS

Oct 2019 - PRESENT

Programming

Languages: Python, Cython, C

Other tools: git, \LaTeX

GitHub profile:  sterinaldi

FIGARO - Fast Inference for GW Astronomy, Research and Observations

[PYTHON](#)

HIERARCHICAL MULTIVARIATE PROBABILITY DENSITY ESTIMATOR BASED ON (H)DPGMM

SOLARSYSTEM

[PYTHON](#)

2PN N-BODY INTEGRATOR BASED ON THE CRANK-NICOLSON METHOD

Teaching Experience

Physics II

PHYSICS DEPARTMENT

- Teaching support activities with Prof. F. Fidecaro

University of Pisa

Nov 2022 - PRESENT

Mathematics

BIOLOGY DEPARTMENT

- Teaching support activities with Prof. A. Maffei and Prof. F. Grotto

University of Pisa

Jan 2022 - Jun 2022

Linear Algebra

ENERGY, SYSTEMS, TERRITORY AND CONSTRUCTION ENGINEERING DEPARTMENT (DESTEC)

- Teaching support activities with Prof. F. Acquistapace

University of Pisa

Oct 2019 - Feb 2020

Physics Laboratory II

PHYSICS DEPARTMENT

- Teaching support activities with Prof. F. Fuso

University of Pisa

Mar 2019 - Sep 2019

Student Mentoring

Daniele Sanfratello

DAILY SUPERVISOR

- Master's thesis: *Unsupervised identification of star clusters using the Dirichlet Process Gaussian Mixture Model*

University of Pisa

May 2022 - PRESENT

Presentations

Past, present and future of gravitational-wave astronomy

THIRD GRAVI-GAMMA WORKSHOP - INVITED TALK

Volterra, Italy

October 5, 2022

Binary black hole mass distribution, the non-parametric way

APS APRIL MEETING - CONTRIBUTED TALK

New York, USA

April 9, 2022

Outreach

Decrittare le onde gravitazionali: l'Universo ascoltando i buchi neri

ITIS "G. GALILEI" - *Decrypting gravitational waves: the Universe listening to black holes*

Livorno, Italy

Jun 8, 2022

Waves: concept and detection

REINFORCE: PHYSICS FOR SENIOR CITIZEN SCIENTISTS

Cascina, Italy

Nov 10, 2021

Selected Publications

- [1] Stefano Rinaldi et al. "On the determination of the constant of gravitation". In: *arXiv e-prints*, arXiv:2209.07416 (Sept. 2022), arXiv:2209.07416. arXiv: [2209.07416](https://arxiv.org/abs/2209.07416) [[gr-qc](#)].
- [2] Stefano Rinaldi and Walter Del Pozzo. "Rapid localization of gravitational wave hosts with FIGARO". In: *MNRAS: Letters* 517.1 (Sept. 2022), pp. L5–L10. ISSN: 1745-3925. doi: [10.1093/mnrasl/slac101](https://doi.org/10.1093/mnrasl/slac101).
- [3] Stefano Rinaldi and Walter Del Pozzo. "(H)DPGMM: a hierarchy of Dirichlet process Gaussian mixture models for the inference of the black hole mass function". In: *MNRAS* 509.4 (Nov. 2021), pp. 5454–5466. ISSN: 0035-8711. doi: [10.1093/mnras/stab3224](https://doi.org/10.1093/mnras/stab3224).
- [4] Simone Mastrogiovanni et al. "Cosmology with Gravitational Waves: A Review". In: *Annalen der Physik* (Aug. 2022), p. 2200180. doi: [10.1002/andp.202200180](https://doi.org/10.1002/andp.202200180).
- [5] Simone Mastrogiovanni et al. "On the importance of source population models for gravitational-wave cosmology". In: *Phys. Rev. D* 104 (6 Sept. 2021), p. 062009. doi: [10.1103/PhysRevD.104.062009](https://doi.org/10.1103/PhysRevD.104.062009).