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Lorenzo Pompili

Education

2021 – June 2025 (expected) **PhD Student**
Max Planck Institute for Gravitational Physics, Potsdam (Germany)
PhD Thesis: *Ever more accurate effective-one-body waveforms for gravitational-wave astrophysics*. Supervisor: Prof. Alessandra Buonanno (Max Planck Institute for Gravitational Physics)

2018 – 2021 **Master Degree in Theoretical Physics - 110/110 cum laude**
Università degli Studi di Perugia, Perugia (Italy)
Master Thesis: *Near-extreme Kerr magnetospheres*. Supervisor: Prof. Marta Orselli (Università degli Studi di Perugia, Niels Bohr Institute)

2015 – 2018 **Bachelor Degree in Physics - 110/110 cum laude**
Università degli Studi di Perugia, Perugia (Italy)
Bachelor Thesis: *Relativistic hydrodynamics*. Supervisor: Prof. Gianluca Grignani (Università degli Studi di Perugia)

Collaboration memberships and service

2024– LISA Distributed Data Processing Center member

- Member of the working groups on massive black hole binaries and stellar-origin black hole binaries of the Waveform Coordination Unit.

2023– LISA Consortium full member

- Coordinator of the collaborative project "Implementation of `pSEOBNR` in the LISA tools" within the LISA Fundamental Physics working group.

- Contributed to the section on effective-one-body waveforms in the LISA Waveform White Paper.

2022– Einstein Telescope Collaboration member

- Contributed to the sections on effective-one-body waveforms and on binary-black-hole waveforms in the Einstein Telescope Blue Book.

2021– LIGO Scientific Collaboration member

- Lead developer and primary contact for the `SEOBNRv5` waveform models.

- Served on the Parameter Estimation ROTA in O4a (regular member) and O4b (expert member).

- Served on the O4a production Parameter Estimation team.

- Contributed to parameter estimation for the GW230529 special event paper.

- Liaison between the Testing General Relativity and Parameter Estimation working groups of the LIGO-Virgo-KAGRA collaboration (since 2024) and Parameter Estimation liaison for the Testing General Relativity paper associated with GWTC-4.

- Analyst for the `pSEOBNR` parameterized ringdown test.

Publications (short author-list)

Publications of which I am lead or co-lead author are marked with *.
Publications with author-list in alphabetical order, as common in the high-energy physics community, are marked with **.

[11] Aldo Gamboa et al. (inc. **Lorenzo Pompili**), *Accurate waveforms for eccentric, aligned-spin binary black holes: The multipolar effective-one-body model SEOBNRv5EHM*

Submitted to Phys.Rev.D, arXiv:2412.12823. **[Citations: 0]**

[10] * **Lorenzo Pompili**, Alessandra Buonanno and Michael Pürrer, *Accounting for Numerical-Relativity Calibration Uncertainty in Gravitational-Wave Modeling and Inference*

Submitted to Phys.Rev.Lett., arXiv:2410.16859. **[Citations: 0]**

[9] * Félix-Louis Julié, **Lorenzo Pompili**, Alessandra Buonanno, *Inspiral-merger-ringdown waveforms in Einstein-scalar-Gauss-Bonnet gravity within the effective-one-body formalism*

Accepted in Phys.Rev.D., arXiv:2406.13654. **[Citations: 13]**

[8] ** Alessandra Buonanno, Gustav Mogull, Raj Patil, **Lorenzo Pompili**, *Post-Minkowskian Theory Meets the Spinning Effective-One-Body Approach for Bound-Orbit Waveforms*

Phys.Rev.Lett. 133 (2024) 21, 211402, arXiv:2405.19181. **[Citations: 18]**

[7] Arnab Dhani et al. (inc. **Lorenzo Pompili**), *Systematic Biases in Estimating the Properties of Black Holes Due to Inaccurate Gravitational-Wave Models*

Submitted to Phys.Rev.X, arXiv:2404.05811. **[Citations: 24]**

[6] Alexandre Toubiana, **Lorenzo Pompili** et al., *Measuring source properties and quasi-normal-mode frequencies of heavy massive black-hole binaries with LISA*

Phys. Rev. D 109 (2024) 10, 104019, arXiv:2307.15086. **[Citations: 20]**

[5] Deyan P. Mihaylov et al. (inc. **Lorenzo Pompili**), *pySEOBNR: a software package for the next generation of effective-one-body multipolar waveform models*

Submitted to SoftwareX, arXiv:2303.18203. **[Citations: 22]**

[4] Maarten van de Meent et al. (inc. **Lorenzo Pompili**), *Enhancing the SEOBNRv5 effective-one-body waveform model with second-order gravitational self-force fluxes*

Phys.Rev.D 108 (2023) 12, 124038, arXiv:2303.18026. **[Citations: 47]**

[3] Antoni Ramos-Buades et al. (inc. **Lorenzo Pompili**), *SEOBNRv5PHM: Next generation of accurate and efficient multipolar precessing-spin effective-one-body waveforms for binary black holes*

Phys.Rev.D 108 (2023) 12, 124037, arXiv:2303.18046. **[Citations: 84]**

[2] Mohammed Khalil et al. (inc. **Lorenzo Pompili**), *Theoretical groundwork supporting the precessing-spin two-body dynamics of the effective-one-body waveform models SEOBNRv5*

Phys.Rev.D 108 (2023) 12, 124036, arXiv:2303.18143. **[Citations: 38]**

[1] * **Lorenzo Pompili** et al., *Laying the foundation of the effective-one-body waveform models SEOBNRv5: improved accuracy and efficiency for spinning non-precessing binary black holes*

Phys.Rev.D 108 (2023) 12, 124035, arXiv:2303.18039. **[Citations: 68]**

Publications (long author-list with direct personal contribution)

Long author-list publications with direct personal contribution, in reversed chronological order. As a member of the LIGO Scientific Collaboration, I am a co-author on several full-collaboration papers, see INSPIRE for a full list.

[3] Anuradha Gupta et al. (inc. **Lorenzo Pompili**), *Possible Causes of False General Relativity Violations in Gravitational Wave Observations*

Submitted to SciPost Physics Community Reports, arXiv:2405.02197. **[Citations: 32]**

[2] LIGO-Virgo-KAGRA Collaboration (inc. **Lorenzo Pompili**), *Observation of Gravitational Waves from the Coalescence of a $\sim 2.5 - 5 M_\odot$ Compact Object and a Neutron Star*

Astrophys.J.Lett. 970 (2024) 2, L34, arXiv:2404.04248. **[Citations: 102]**

[1] LISA Consortium Waveform Working Group (inc. **Lorenzo Pompili**), *Waveform Modelling for the Laser Interferometer Space Antenna*

Submitted to Living Rev.Rel., arXiv:2311.01300. **[Citations: 80]**

Talks and conferences

Invited talks are marked with *.

09/2024 LIGO-Virgo-KAGRA Collaboration Meeting, Barcelona - *Accounting for Numerical-Relativity Calibration Uncertainty in Gravitational-Wave Modeling and Inference*

09/2024 TEONGRAV Workshop, Rome - *Inspiral-merger-ringdown waveforms in Einstein-scalar-Gauss-Bonnet gravity within the effective-one-body formalism*

09/2024 * Fundamental Physics Meets Waveforms With LISA, Potsdam - *SEOBNRv5: advancements in effective-one-body gravitational waveforms towards LISA*

09/2024 * Fundamental Physics Meets Waveforms With LISA, Potsdam. Panel member: *LISA MBHB Accuracy Requirements*

09/2024 * Fundamental Physics Meets Waveforms With LISA, Potsdam. Panel member: *Impact of systematics on tests of GR*

07/2024 * PAX IX Workshop, London. Panel member: *Waveform challenges and Numerical Relativity*

03/2024 LIGO-Virgo-KAGRA Collaboration Meeting, Baton Rouge - *Inspiral-merger-ringdown waveforms in Einstein-scalar-Gauss-Bonnet gravity within the effective-one-body formalism*

09/2023 LIGO-Virgo-KAGRA Collaboration Meeting, Toyama - *Accounting for numerical relativity calibration uncertainty in modeling and inference of gravitational waves*

07/2023 26th Capra Meeting on Radiation Reaction in General Relativity, Copenhagen - *Enhancing the SEOBNRv5 effective-one-body waveform model with second-order gravitational self-force fluxes*

09/2022 LIGO-Virgo-KAGRA Collaboration Meeting, Cardiff - *Update on SEOBNR waveform development for O4a*

03/2022 DPG Spring Meeting, Heidelberg (virtual) - *New generation effective-one-body waveforms for binary black-holes with non-precessing spins*

Teaching experience

2022 Teaching assistant for Prof. Buonanno's course on Gravitational Waves, *Humboldt University, Berlin*

Organization of workshops and conferences

09/2024 Fundamental Physics Meets Waveforms With LISA Workshop, *Local organizing committee*

Service

2023- Referee for Phys. Rev. D

2023- Organizer of weekly meetings dedicated to LIGO science at the AEI

2021- Organizer of weekly meetings dedicated to effective-one-body waveform modeling at the AEI

Outreach

11/2024 *Deciphering Black Hole Symphonies: The New World of Gravitational Wave Astronomy*, Berlin Science Week 2024.

IT Skills

Python, Cython, Mathematica, C/C++; HTCondor, Slurm, Git, LaTeX

Open source software: pySEOBNR: accurate and efficient gravitational wave models for compact binary coalescences using the effective-one-body approach.