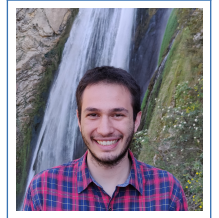# Lorenzo Speri

*PhD Student
in Gravitational-Wave Physics*

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Born: 26/01/1996

Education

September 2020 -
PhD, *Max Planck Institute for Gravitational Physics (Albert Einstein Institute)*.
Waveform modeling of Extreme Mass Ratio Inspirals.
Statistical methods for LISA gravitational wave observations as probes for cosmology.
Development of robust statistical tools for Pulsar Timing Array analysis.

2018 - 2020
Master of Theoretical Physics MSc, *University of Heidelberg*.
Master thesis: *Effective Resonance Model: a small step for the constants of motion, a giant leap for biases in EMRI parameter estimation* jointly supervised by Prof. Jonathan Gair (Max Planck Institute for Gravitational Physics) and Prof. Matthias Bartelmann (University of Heidelberg).

2015 - 2018
Bachelor of Physics BSc, *University of Trento*.
Erasmus+ Programme Scholarship: 10 months as an exchange student at the University of Oslo (2017/2018).
Thesis: *Analyzing Gravitational Waves through Numerical Simulations of Compact Binaries* under the supervision of Prof. Bruno Giacomazzo.
`https://github.com/lorenzsp/Bachelor-Thesis`
Degree examination: 110/110

Pubblications

12/03/2021
Assessing the impact of transient orbital resonances, L. Speri and J. R. Gair.
We assess how transient orbital resonances of Extreme Mass Ratio Inspirals influence the gravitational wave signals and their possible detectability with LISA.
`https://arxiv.org/abs/2103.06306`, suitable for publication and under revision at *Phys. Rev. D*

20/10/2020
Testing the Quasar Hubble Diagram with LISA Standard Sirens, L. Speri, N. Tamanini, R.R. Caldwell, J.R. Gair and B. Wang.
We demonstrate that LISA Massive Binary Black Hole Binaries observations will be able to test the Quasar Hubble Diagram and probe the cosmic expansion at high redshifts.
`https://arxiv.org/abs/2010.09049`, accepted at *Phys. Rev. D*

Awards

September 2019
Merit Award, *University of Trento*.
Students who have achieved remarkable results at the end of their degree

Teaching Experience

Winter Semester 2020/2021
Teaching assistant of Prof. Dr. Alessandra Buonanno for the course of Gravitational Waves, *Humboldt University*.

Memberships and Organisational Duties

2020 - **LISA Consortium member**.

2020 - **EPTA member**.

2020 - **AEI LISA meeting organiser**.
In charge of organising monthly meetings related to LISA science at the Max Planck Institute for Gravitational Physics (Albert Einstein Institute).

Talks

21/04/2021 **Assessing the impact of transient orbital resonances**, *University of Southampton*.

25/02/2020 **Effects of transient resonances on Gravitational Waves from EMRIs**, *University of Heidelberg*.

02/09/2018 **Cosmological Evidences of Dark Matter from the CMB**, *University of Heidelberg*.
Physics of the Cosmological Microwave Background and the cosmological evidence of dark matter through the analysis of the CMB fluctuations within the ΛCDM model.

Conferences, Workshops and Schools

1-3/09/20 **LISA Symposium XIII**, *Online*.

25-27/05/20 **BHPToolkit Spring 2020 workshop**, *Online*.

20-24/05/19 **The Mysterious Universe: Dark Matter - Dark Energy - Cosmic Magnetic Fields**, *Mainz Institute for Theoretical Physics, Johannes Gutenberg University*.

13-15/05/19 **LISA Waveform Working Group Meeting**, *Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Potsdam*.

8-12/04/19 **Advanced Workshop on Accelerating the Search for Dark Matter with Machine Learning**, *ICTP, Trieste*.

11-22/03/19 **Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation**, *Galileo Galilei Institute, Firenze*.

09/2018 **Gaia Data & Science**, *University of Heidelberg*.

04/2018 **Spring workshop in nuclear and particle physics**, *CERN*.

09/2014 **Discovering high-mass particles with CMS**, *University of Padova*.

IT Skills

C/C++ Scientific Programming.
Numerical simulations of Extreme Mass Ratio Inspirals, prediction of Hubble expansion function with measurements of SuperNovae TypeIa using function basis series, parallelized Monte Carlo sampling, Crank-Nicolson algorithm for solving 2d diffusion equation, ODE solvers.

Python, Matlab.
Basic Machine Learning algorithms, Data Cleaning and Data Visualization.

EinsteinToolkit, Cactus Framework.
Numerical relativistic simulations of compact binaries.

The codes of the numerical simulations, the scripts of the data analysis and data visualization are available on my GitHub address `https://github.com/lorenzsp`

Language Skills

Italian   Native language

English   Fluent

German   B2

Other

Academic Website, `https://www.aei.mpg.de/person/102224`.

GitHub Website, `https://github.com/lorenzsp`.

Personal Interests.
I play piano and I love listening to classical music. I have played rugby for six years, but I also like swimming, skiing and climbing.