Oliver Long

Academic positions

Doctoral Prize Research Fellow, University of Southampton — Aug 2022 – Present

- Research: Modelling of hyperbolic orbits of binary black holes with back-reaction in the extreme-mass-ratio limit using perturbation theory focusing on calculating the scalar self-force correction to the scatter angle as well as calculating the scatter angle to first-order in the mass ratio.

Doctoral Prize Senior Research Assistant, University of Southampton — Jun 2022 - Jul 2022

- Research: See above.

Research Assistant, University of Southampton — Jan 2022 – Mar 2022

- Research: Modelling of hyperbolic orbits of binary black holes with back-reaction in the extreme-mass-ratio limit using perturbation theory focusing on calculating the scalar self-force correction to the scatter angle.

Education

PhD in Mathematical Sciences, University of Southampton — Sep 2018 – Jun 2022

- Project title: Self-force in hyperbolic black hole encounters.
- Supervisor: Prof. Leor Barack.
- Project: Modelling of hyperbolic orbits of binary black holes with back-reaction in the extreme-mass-ratio limit using perturbation theory focusing on the derivation and development of a model to calculate the self-force correction to the scatter angle.
- Teaching: Running of undergraduate problem classes and helping with assessment.

MPhys in Physics, The University of Manchester — Sep 2014 – Jun 2018

- Final degree grade: First-class honours with an average of 80.4%.
- Modules: Gravitation, The Early Universe, Quantum Field Theory, Electrodynamics, etc.
- Master's project: Using Markov chain Monte Carlo methods on power spectra of the cosmic microwave background to resolve various tensions in the data through the use of different cosmological models.

A levels, Hereford Sixth Form College — Sep 2012 – Jun 2014

- A2 levels: Physics (A*), Mathematics (A), Chemistry (A) and Biology (A).
- AS levels: Further Mathematics (A).

GCSEs, Lacon Childe School — Sep 2007 – Jun 2012

- Eleven level 2 awards including GCSEs in English language and German.

Computing

- Extensive experience with `Mathematica` including tensor algebra, data analysis and graphics.
- Extensive experience with `C++` including numerical calculation and data analysis.
- Extensive experience with `Python` including data analysis and graphics.
- Extensive experience with LaTeX.
- Contributor of scatter orbits to the KerrGeodesics package of the Black Hole Perturbation Toolkit.

Prizes

- **Doctoral Prize**, Engineering and Physical Sciences Research Council. 2022
- **Best Student Talk Runner Up**, 25th Capra Meeting on Radiation Reaction in GR. Jun 2022

Updated 9th September 2022.

Oliver Long

Publications

- L. Barack & **O. Long**. Self-force correction to the deflection angle in black-hole scattering: a scalar charge toy model. arXiv:2209.03740 [gr-qc].
- **O. Long** & L. Barack. Time-domain metric reconstruction for hyperbolic scattering. *Phys. Rev. D*, 104(024014), July 2021.

Conference presentations

- "Self-force in hyperbolic black hole encounters", LISA Symposium XIV, 25th – 29th July 2022.
- "Self-force in hyperbolic black hole encounters", 23rd International Conference on General Relativity and Gravitation, Chinese Academy of Science via Zoom, 5th July 2022.
- "Self-force in hyperbolic black hole encounters", 25th Capra Meeting on Radiation Reaction in General Relativity, University College Dublin, 22nd June 2022.
- "Self-force in hyperbolic binary-black-hole encounters", BritGrav22, University of Glasgow via Zoom, 4th April 2022.
- "Time-domain metric reconstruction for hyperbolic scattering", 24th Capra Meeting on Radiation Reaction in General Relativity, Perimeter Institute via Zoom, 10th June 2021.
- "Towards a self-force calculation of the scatter angle in hyperbolic encounters", BritGrav21, University College Dublin via Zoom, 13th April 2021.
- "Towards a self-force calculation of the scatter angle in hyperbolic encounters", LISA Symposium XIII, 1st – 3rd October 2020.
- "Towards a self-force calculation of the scatter angle in hyperbolic encounters", 23rd Capra Meeting on Radiation Reaction in General Relativity, University of Texas at Austin via Zoom, 24th June 2020.

Conference posters

- "Time-domain metric reconstruction using the Hertz potential", 3rd meeting of the GWVerse COST action, Institute for Fundamental Physics of the Universe, International School for Advanced Studies, 13th – 16th January 2020.

Other events attended

- Black Hole Perturbation Toolkit Workshop (via Zoom), The Institute for Computational and Experimental Research in Mathematics, Brown University, 25th – 27th July 2022.
- From Scattering Amplitudes to Gravitational-Wave Predictions for Compact Binaries, Universität Zürich & ETH Zürich, 4th – 15th July 2022.
- Advances and Challenges in Computational Relativity Workshop (Online), The Institute for Computational and Experimental Research in Mathematics, Brown University, 14th – 18th September 2020.
- Black Hole Perturbation Toolkit Workshop (Online), Astronomical Institute of the Academy of Sciences of the Czech Republic, 25th – 27th May 2020.
- Kavli RISE Summer School on Gravitational Waves, University of Cambridge, 23rd – 27th September 2019.
- 22nd International Conference on General Relativity and Gravitation and 13th Edoardo Amaldi Conference on Gravitational Waves, Palau de congressos de Valencia, 8th – 12th July 2019.
- 22nd Capra Meeting on Radiation Reaction in General Relativity, Centro Brasileiro de Pesquisas Físicas, 17th – 21st June 2019.
- LISA Waveform Working Group Meeting, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), 13th – 15th May 2019.

Updated 9th September 2022.

- BritGrav19, Durham University, 15th – 16th April 2019.
- Black Hole Perturbation Toolkit Workshop, University College Dublin, 19th – 21st March 2019.

LISA Consortium

- Full member of the LISA Consortium since October 2018.
- Member of the Waveform Working Group and LISA Early Career Scientists (LECS).
- Current work is part of LISA Science Group's Work Package 1.2.2.

References

Available upon request.