

Christopher Whittall

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Research positions

Postdoctoral Research Fellow

Sep. 2024 - Present

University of Birmingham

- Developing accelerated waveform templates for current and next-generation gravitational observatories using reduced order modelling and machine learning.
- Demonstrated a novel approach using Fourier-Gegenbauer reconstruction for frequency-domain self-force calculations, with applications to scattering and other highly eccentric orbits.
- Regular service on the LIGO-Virgo-KAGRA PE rota, contributing to follow-up parameter estimation for gravitational wave candidate events from the O4b and O4c observing runs.

PhD Student

Sep. 2020 - Sep. 2024

University of Southampton

- Developed frequency-domain numerical techniques to calculate the self-force during hyperbolic black hole encounters.
- Applied numerical self-force calculations along scatter orbits to re-sum analytical post-Minkowskian expansions of the scatter angle.

Education

PhD in Mathematical Sciences

Sep. 2020 – Sep. 2024

University of Southampton

- Thesis title: *Frequency-domain approach to self-force in hyperbolic scattering*
- Supervisor: Leor Barack
- Teaching: undergraduate computer labs; face-to-face feedback and instruction in mathematical methods for undergraduate engineers; marking undergraduate problem sheets.

MMath in Mathematics

Sep. 2019 – Jun. 2020

University of Cambridge

- 92% in final examination. Pass with Honours. [Conventional classifications not awarded due to onset of the coronavirus pandemic.]
- Courses including: General Relativity, Black Holes, Cosmology and QFT.
- Essay project: spontaneous scalarisation of neutron stars in scalar-tensor gravity.

BA in Mathematics

Oct. 2016 – Jun. 2019

University of Cambridge

- Class I in 3rd year of the Mathematical Tripos.
- Courses covering a wide range of pure and applied mathematics and theoretical physics.

Other research experience

Summer research student

DAMTP, University of Cambridge

Jul. 2019 - Sep. 2019

- Numerically investigated the stability of nonlinear wave equations obeying the classical null condition on compact manifolds. Supervised by Dr Joseph Keir.

Visiting scientist

UK Meteorological Office

Jul. 2018 - Sep. 2018

- Developed and implemented a model of atmospheric refraction of ADS-B radio transmissions from aircraft, and applied this to analyse the sensitivity of angle of arrival information to changes in weather profile. Supervised by Malcolm Kitchen.

Publications [4 reviewed]

Featured publications

- [1] C. Whittall, L. Barack and O. Long, "Frequency-domain self-force calculations using Gegenbauer reconstruction", Phys. Rev. D **112**, 124045 (2025), arXiv:2509.19439 [gr-qc].
- [2] O. Long, C. Whittall and L. Barack, "Black hole scattering near the transition to plunge: Self-force and resummation of post-Minkowskian theory", Phys. Rev. D **110**, 044039 (2024), arXiv:2406.08363 [gr-qc].
- [3] C. Whittall and L. Barack, "Frequency-domain approach to self-force in hyperbolic scattering", Phys. Rev. D **108**, 064017 (2023), arXiv:2305.09724 [gr-qc].
Chosen as an Editors' Suggestion in Physical Review D and awarded a 2023 STAG publication prize.

Other publications

- [4] The LIGO Scientific Collaboration, the Virgo Collaboration and the KAGRA Collaboration (including C. Whittall), "Black Hole Spectroscopy and Tests of General Relativity with GW250114", Phys. Rev. Lett. **136**, 041403 (2026), arXiv:2509.08099 [gr-qc]

Talks and presentations [5 invited, 8 contributed]

Invited talks

- "Numerical approaches to self-force calculations along scatter orbits", 2nd Annual Workshop on Self-force and Amplitudes, University of Southampton, 10th September 2025.
- "Black hole scattering: the self-force approach", Centre for Theoretical Physics, Queen Mary University of London, 25th March 2024.
- "Self-force in black hole scattering: a scalar-field toy model", Gravitational Self Force and Scattering Amplitudes, University of Edinburgh, 20th March 2024.

- "Black hole scattering: the self-force approach", QCD Meets Gravity IX, CERN, 14th December 2023.
- "Self-force in hyperbolic black hole scattering", Satellite seminar during Asymmetric Binaries meet Fundamental Astro-Physics, Gran Sasso Science Institute, 20th September 2023.

Contributed talks

- "Frequency-domain self-force calculations using Gegenbauer reconstruction", 28th Capra Meeting on Radiation Reaction in General Relativity, University of Southampton, 23rd July 2025.
- "Frequency-domain self-force scatter calculations using the Gegenbauer procedure", 24th International Conference on General Relativity and Gravitation and 16th Edoardo Amaldi Conference on Gravitational Waves, Glasgow, 14th July 2025.
- "Black hole scattering near the transition to plunge: self-force and resummation of post-Minkowskian theory", BritGrav 25, University of Birmingham, 28th April 2025.
- "Self-force scattering in the strong and weak field", 27th Capra Meeting on Radiation Reaction in General Relativity, National University of Singapore, 17th June 2024.
- "Self-force in hyperbolic scattering: a frequency-domain approach", 26th Capra Meeting on Radiation Reaction in General Relativity, Niels Bohr Institute, 4th July 2023.
- "Self-force in hyperbolic scattering: a frequency-domain approach", 23rd International Conference on General Relativity and Gravitation (online), Chinese Physical Society, 5th July 2022.
- "Self-force in hyperbolic scattering: a frequency-domain approach", 25th Capra Meeting on Radiation Reaction in General Relativity, University College Dublin, 22nd June 2022.
- "Frequency domain approach to self-force in hyperbolic scattering", 24th Capra Meeting on Radiation Reaction in General Relativity (online), Perimeter Institute, 10th June 2021.

Other events attended [7 total]

- PAX-X and the 3rd Cosmic Explorer Symposium, University of Illinois at Urbana-Champaign, 30th June - 3rd July 2025.
- FastEMRIWaveforms Hackathon 2025, University of Southampton, 3rd - 7th March 2025.
- Gravitational Wave Analysis in the Era of Machine Learning, Royal Astronomical Society, 10th January 2025.

- 3rd Einstein Telescope Annual Meeting, University of Warsaw [attended online], 12th - 15th November 2024.
- Gravitational Memory Effects: From Theory to Observation, Queen Mary University of London [attended online], 5th - 9th June 2023.
- From Scattering Amplitudes to Gravitational-Wave Predictions for Compact Binaries, Universität Zürich & ETH Zürich, 4th - 15th July 2022.
- BritGrav21, University College Dublin [attended online], 12th – 16th April 2021.

Computing experience

Extensive experience in scientific computing on high-performance CPU and GPU clusters.

Advanced: Bash, C/C++, L^AT_EX, Linux, Python, SLURM, Windows.

Intermediate: CuPy, Git, Mathematica, MATLAB, OpenMP, TensorFlow.

Basic: GDB, HTML, macOS, Markdown.

Service

- Discussion Co-Chair, "Modelling Approaches", 27th Capra Meeting on Radiation Reaction in General Relativity, National University of Singapore, 17 June 2024.
- President (2018–19) and Treasurer (2017–18), Adams Society, St John's College
 - Organised a programme of academic talks.
 - Managed society finances and budgeting.
 - Engaged with faculty, sponsors, students, and college authorities.

Research collaborations

LISA Consortium: Core Member **Mar. 2024 – Present**

- Member of the Waveform and Early Career Scientist Working Groups.
- Member of the “0PA” and “1PA conservative” verified self-force data teams.
- Associate Member of previous LISA consortium from Mar 24 - May 25.

LIGO Scientific Collaboration: Member **Oct. 2024 – Present**

Einstein Telescope Collaboration: Member **Oct. 2024 – Present**

Prizes and awards

2023: STAG prize for best student publication in gravitational physics, *awarded by the STAG Research Centre, University of Southampton.*

2018 – 2020: Wright prize (2019, 2020), Ian Hall Year Prize (2019), College Prize (2018) and Horne Scholarship (2018 – 20), *awarded by St John's College, Cambridge for examination results.*

References

Available on request.

Last compiled: February 6, 2026.