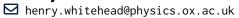
Henry Whitehead



Personal Website

NASA ADS

Academic History

2022- **DPhil, University of Oxford** Astrophysics

Supervised by Prof. Bence Kocsis, studying black hole interactions in AGN discs by use of hydrodynamic simulations

2017-2021

MSci, University of Cambridge Natural Sciences - First Class Astrophysics specialisation, recipient of scholarship and two college prizes

Research Interests

Active Galactic Nuclei; Black Holes; Hydrodynamics; Binaries; Gravitational Waves; Object-Disc Interactions; Computational and Theoretical Astrophysics; High Performance Computing; Astrophysical Data Visualisation

Research Publications

First Author

- H. Whitehead, C. Rowan, and B. Kocsis, "Hydrodynamic simulations of black hole evolution in AGN discs II: inclination damping for partially embedded satellites", arXiv e-prints, arXiv:2505.23899, arXiv:2505.23899, May 2025. ODI: 10.48550/arXiv.2505.23899. arXiv: 2505.23899 [astro-ph.HE].
- H. Whitehead, C. Rowan, and B. Kocsis, "3D Adiabatic Simulations of Binary Black Hole Formation in AGN", arXiv e-prints, arXiv:2502.14959, arXiv:2502.14959, Feb. 01 2025. Ø DOI: 10.48550/arXiv.2502.14959. arXiv: 2502.14959 [astro-ph.HE].
- **H. Whitehead**, C. Rowan, T. Boekholt, and B. Kocsis, "Disc novae: thermodynamics of gas-assisted binary black hole formation in AGN discs", vol. 533, no. 2, pp. 1766–1781, Sep. 03 2024. ODOI: 10.1093/mnras/stae1866. arXiv: 2312.14431 [astro-ph.HE].
- H. Whitehead, C. Rowan, T. Boekholt, and B. Kocsis, "Gas assisted binary black hole formation in AGN discs", vol. 531, no. 4, pp. 4656–4680, Jul. 05 2024. Ø DOI: 10.1093/mnras/stae1430. arXiv: 2309.11561 [astro-ph.GA].
- **H. Whitehead** and J. H. Matthews, "Studying the link between radio galaxies and AGN fuelling with relativistic hydrodynamic simulations of flickering jets",, vol. 523, no. 2, pp. 2478–2497, Aug. 06 2023.

 **DOI: 10.1093/mnras/stad1582. arXiv: 2305.19328 [astro-ph.HE].

Latter Author

- C. Rowan, **H. Whitehead**, G. Fabj, P. Kirkeberg, M. E. Pessah, and B. Kocsis, "Hydrodynamic simulations of black hole evolution in AGN discs I: orbital alignment of highly inclined satellites", *arXiv e-prints*, arXiv:2505.23739, arXiv:2505.23739, May 2025. arXiv: 2505.23739 [astro-ph.HE].
- C. Rowan, **H. Whitehead**, G. Fabj, *et al.*, "Prompt gravitational-wave mergers aided by gas in Active Galactic Nuclei: The hydrodynamics of binary-single black hole scatterings", Apr. 2025. ODOI: 10.1093/mnras/staf547. arXiv: 2501.09017 [astro-ph.GA].
- C. Rowan, **H. Whitehead**, and B. Kocsis, "Black Hole Merger Rates in AGN: contribution from gas-captured binaries", *arXiv e-prints*, arXiv:2412.12086, arXiv:2412.12086, Dec. 2024. *9* DOI: 10.48550/arXiv.2412.12086. arXiv: 2412.12086 [astro-ph.HE].
- C. Rowan, **H. Whitehead**, T. Boekholt, B. Kocsis, and Z. Haiman, "Black hole binaries in AGN accretion discs II. Gas effects on black hole satellite scatterings", vol. 527, no. 4, pp. 10 448–10 468, Feb. 04 2024. ODI: 10.1093/mnras/stad3641.

Grants & Research Scholarships

July 2024

UKRI OPP503: PI for Project APP35272 awarded 3.65 million CPUh on CSD3 (Cambridge Service for Data Driven Discovery)

Professional Activities

Referee for various astrophysical journals

- Monthly Notices of the Royal Astronomical Society (MNRAS)
- The Astrophysical Journal (ApJ)
- The Astrophysical Journal Letters (ApJ Letters)
- Astronomy and Astrophysics (A&A)

Conference Presentations

June 2025	Inclination Damping of BH Satellites in AGN Discs, DYNAMIX, Institute of Astronomy, University of Cambridge
August 2024	Cyclonic Winds: 3D Outflows from Black Holes Embedded in AGN Discs, The Origin of Black Hole Mergers, Niels Bohr Institute
December 2023	■ Disc Novae: Thermodynamics of Gas Assisted Binary Black Hole Formation in AGN Discs, RESCEU-NBIA workshop on gravitational-wave sources, University of Tokyo
July 2023	■ Gas Assisted Binary Black Hole Formation in AGN Discs, National Astronomy Meeting, Cardiff University

Skills and Experience

Coding	Python, C, C++, CUDA, with a strong interest to improve further
Simulation	Current user of Athena++, previous experience with PLUTO, MESA and Arepo
Clusters	Experienced user of various High Performance Computing clusters, including Oxford's Advanced Research Computing (ARC) service and the Cambridge Center for Data Driven Discovery (CSD ₃)
Internships	8-week research internship studying the hydrodynamics of flickering relativistic jets in AGN (2021, Institute of Astronomy, Cambridge)

8-week research internship on the evolution of the convective envelopes of massive stars (2019, Institute of Astronomy, Cambridge)

References

Principle referee Prof. Bence Kocsis (bence.kocsis@physics.ox.ac.uk), others available upon request.