Darius Michienzi

PhD Researcher in Black Hole Astrophysics

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Research Interests

X-ray reflection from accreting black holes, in both X-ray binaries and AGN. I study how the geometry of the corona shapes the illumination of the accretion disc and, in turn, the observed reflection spectrum, motivated by recent IXPE polarimetry constraints. I combine general-relativistic ray tracing with X-ray spectroscopy, and aim to develop a general method applicable to any axisymmetric coronal geometry across a broad range of sources.

Education

Sep 2024 – Mar 2028 (exp.) **PhD in Astrophysics**, University of Bristol
Supervisor: Prof. Andrew Young · Funded by an STFC studentship

2019 – 2023 **MSci Physics with Astrophysics**, University of Bristol — **First Class Honours**
Independent final-year project: *Exploring the effect of optical selection on X-ray scaling relations for galaxy clusters using the eROSITA telescope*
Supervisor: Prof. Ben Maughan

Research Experience

2025 – present **Coronal geometry and disc illumination in MAXI J1348−630**

- Modelling disc illumination profiles for lamppost, ring and disc coronae, building towards a general method for arbitrary axisymmetric geometries.
- Fitting the resulting reflection spectra to NuSTAR observations of the black hole X-ray binary MAXI J1348−630, using a NuSTAR reduction pipeline I developed.
- GR ray tracing with Gradus.jl and Kerrz (Julia); HPC on Isambard 3 / Isambard-AI.
- Collaborators: Dr Jiachen Jiang (Warwick), Dr Fergus Baker (Newcastle). Paper in preparation.

2024 – 2025 **Relativistic absorption as an alternative to ultra-fast outflows in AGN**

- Tested whether broad absorption features usually attributed to ultra-fast outflows can instead arise from relativistically broadened absorption by material co-rotating close to the black hole.
- Archival XMM-Newton data of IRAS 13224−3809, using an XMM-Newton reduction pipeline I developed.

Publications

In preparation **Michienzi, D.**, Young, A. J., Jiang, J., et al., *Coronal geometry and disc illumination in MAXI J1348−630* (working title)

Talks and Posters

Contributed talks

"Illuminating the Disc and Corona: Geometric Models of MAXI J1348−630"

Sep 2026 **New Results in X-ray Astronomy & NewAthena 2026**, University of Leicester

Jul 2026 **National Astronomy Meeting (NAM 2026)**, University of Birmingham

Jun 2026 **Bath Bristol Exeter Cardiff Student Seminar (BBECSS)**, University of Bristol

Apr 2026 **ISSI International Team workshop, *Maximizing the Potential of X-ray Polarimetric Data to Understand Accreting BHs***, ISSI, Bern, Switzerland

Posters

"Exploring Transient Relativistic X-ray Absorption Features in IRAS 13224−3809"

Sep 2025 **New Results in X-ray Astronomy & NewAthena 2025**, University of Bristol

Jul 2025 **National Astronomy Meeting (NAM 2025)**, Durham University (with flash talk)

Jun 2025 **Vasto Accretion Meeting: AGN (VAM 2025)**, Vasto, Italy (with flash talk)

Upcoming

Jan 2027 **NewAthena Science Working Group 2 Meeting**, ESA/ESTEC, Noordwijk, Netherlands (abstract submitted)

Collaborations and meetings attended

2025 – present **ISSI-Beijing International Team**, *Connecting Observations and Numerical Simulations: A New Paradigm for Black Hole Accretion Studies* — early-career member; in-person team meeting, ISSI-BJ, Beijing, China (Mar 2026)

Apr 2026 **RAS Specialist Discussion Meeting: *Feeling Strong Gravity***, Bristol

Dec 2025 **First AGN UK Community Meeting**, University of Hertfordshire

Oct 2025 **RAS Specialist Discussion Meeting: *AGN-Driven Multiphase Outflows***, London

Oct 2024 **RAS Specialist Discussion Meeting: *Black Holes and AGN in the Era of EHT, JWST and Rubin***, London

Internal presentations (University of Bristol)

2024 – present Regular presenter at the Black Hole Journal Club (approx. every 8 weeks), group lunch meetings (preprints and progress updates) and the Astrophysics Developer Group (Manim, Advent of Code).

Funding and Awards

2024 – 2028 **STFC PhD Studentship**, University of Bristol

2026 **RAS Undergraduate Bursary**, with University of Bristol co-funding — secured to fund a summer research project I designed and supervised

2025, 2026 **Peter Bye Travel Grant**, University of Bristol (twice), for NAM 2025 and NAM 2026

2025 – present **Computing time**, Isambard 3 / Isambard-AI, via allocation of Prof. A. Young

Teaching and Supervision

Summer 2026 **Primary supervisor**, 8-week undergraduate summer research project, University of Bristol
Designed the project *Deviations from the Kerr metric as a test of General Relativity*, using the Johannsen metric in Gradus.jl; supervised a 3rd-year undergraduate.

2025 – present **Teaching assistant, General Relativity** (4th year), University of Bristol
Problem-class support; marked all coursework.

2026 – present **Coursework marker, Galaxies** (undergraduate), University of Bristol

2024 – 2026 **Laboratory demonstrator, 1st-year Physics Laboratories**, University of Bristol
4.5 hrs/week in term time; supported students through experiments; marked lab books and formal reports.

2023 – 2024 **Online personal tutor** (part-time), A-level and GCSE Physics and Mathematics
One-to-one weekly sessions with 6–8 students.

Outreach and Public Engagement

Jul 2026 – present	**Organising committee, Astronomy on Tap Bristol** — monthly public astronomy talks; involved in organising each event.
Aug 2026	**Public talk**, *"Eclipses Past, Present, and Future"*, Astronomy on Tap Bristol
2025 – 2026	**Public observing**: solar telescope viewing for the partial solar eclipse (Mar 2025); telescope viewing for passers-by in Royal Fort Gardens during the Bristol Light Festival (2026)
2023 – present	**University open days**, School of Physics, Bristol (2023, 2024, Oct 2026) — promoting astrophysics to prospective students, demonstrations and tours

Leadership and Service

Sep 2026 – present	**Organiser, Astrophysics Developer Group**, University of Bristol
Mar 2026 – present	**Organiser, Black Hole Journal Club**, University of Bristol
2026	**Co-organiser, BBECSS 2026** (Bath Bristol Exeter Cardiff Student Seminar) — organised with one other PhD student
2025	**Local Organising Committee**, New Results in X-ray Astronomy & NewAthena 2025, Bristol

Skills

Programming	Julia (primary), Python
X-ray analysis	HEASoft, XSPEC, SAS (XMM-Newton), NuSTARDAS
Modelling	GR ray tracing and reflection modelling (Gradus.jl, Kerrz); spectral fitting
Open source	Contributor to SpectralFitting.jl
Tools	Git, Linux, LaTeX, Manim, HPC (Isambard 3 / Isambard-AI)
Languages	English (native); Italian (basic, currently taking lessons)

Memberships and Interests

Membership	Fellow of the Royal Astronomical Society (FRAS)
Interests	Programming puzzles (completed Advent of Code 2024 and 2025); science communication

Referees

Prof. Andrew Young
PhD supervisor
School of Physics, University of Bristol
Andy.Young@bristol.ac.uk

Dr Jiachen Jiang
Collaborator; Assistant Professor (Teaching)
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