CURRICULUM VITAE

Dominic J. Walton - Associate Professor in Astrophysics

CONTACT INFORMATION

Centre for Astrophysics Research
University of Hertfordshire
Hatfield
AL10 9AB

Office: +44 (0)1707 284747
E-mail: d.walton4@herts.ac.uk

NATIONALITY

British

LANGUAGES

English (fluent) – German (basic – intermediate)

EMPLOYMENT

Associate Professor in Astrophysics — 2025–present
Senior Lecturer in Astrophysics — 2021–2025
Centre for Astrophysics Research, University of Hertfordshire
Hatfield, United Kingdom

STFC Ernest Rutherford Fellow — 2016–2021
Institute of Astronomy, University of Cambridge
Cambridge, United Kingdom

NASA Postdoctoral Fellow — 2014–2016
Jet Propulsion Laboratory, California Institute of Technology
Pasadena, California, USA
Adviser: Dr. Daniel Stern

NuSTAR Research Scientist — 2012–2014
Space Radiation Laboratory, California Institute of Technology
Pasadena, California, USA
Adviser: Prof. Fiona Harrison

EDUCATION

School of Learning & Teaching, University of Hertfordshire, UK — 2021–2023
PgCert in Learning and Teaching in Higher Education

Institute of Astronomy, University of Cambridge, UK — 2008–2012
Ph.D. in X-ray Astronomy
Adviser: Prof. Andrew Fabian
Thesis: *X-ray Emission and Reflection from Accreting Black Holes*

Durham University, Durham, UK — 2004–2008
M.Sci., Physics & Astronomy, 2008
Adviser: Dr. Timothy P. Roberts
Graduated with first class honours
Thesis: *Ultraluminous X-ray Sources in Nearby Galaxies*

RESEARCH INTERESTS

The connection between accreting black holes across the mass scale

Accretion flows onto compact objects – black holes, neutron stars

The nature of the compact objects powering ultraluminous X-ray sources (ULXs)

Matter in the strong gravity regime – Iron fluorescence emission as a diagnostic for black hole spin and accretion flow geometry.

Extending black hole spin measurements beyond the local universe.

Identification of the intrinsic emission processes in accreting black holes

Time-domain/transient astronomy

Research Skills

Substantial experience in the data reduction and analysis of observations of X-ray binaries, ultraluminous X-ray sources and active galaxies:

Data reduction: XMM-Newton, *Suzaku*, *Swift*, *Chandra* and *NuSTAR*.

Analysis: Time-averaged, time resolved and flux resolved spectral analyses of bright and faint X-ray sources, timing analysis, population studies and source catalogues.

Ground-based Observing: Moderate experience using MOSFIRE on Keck

Professional Memberships & Service

Current Missions:

Member of the science and operations teams for NASA's *NuSTAR* X-ray observatory, leading the Science Working Group (SWG) studying Ultraluminous X-ray Sources, and also playing an active role in the Commissioning and Calibration team as well as the SWGs focused on Galactic X-ray Binaries, Active Galactic Nuclei, and Legacy Surveys

Served on the Time Allocation Committee for the *Suzaku, NuSTAR, NICER, Chandra* (including as both deputy chair and chair for my topical panel) and *XMM-Newton* observatories, the review panel for the NASA Astrophysics Data Analysis Program (ADAP), and the Technical Review Team for the *NuSTAR* observatory

Co-author of the *Suzaku* (2013) and *NuSTAR* (2014, 2016, 2019, 2022) mission extension proposals for the NASA Senior Review Committee

Member of the *Chandra* X-ray Observatory Users' Committee (2017–2020)

Future Missions:

Deputy chair of the 'accretion physics' pillar for the the *High Energy X-ray Probe* (*HEX-P*) concept – a Probe-class mission submitted to NASA

Member of the Luminous Extragalactic Tranients and Close SMBH Environments working groups for ESA's *Athena* X-ray observatory

Lead author for an *Athena* white paper on ULXs, proposed for inclusion in the upcoming *Athena* special issue of Astronomy & Astrophysics

Member of the science team studying the *Monitoring Spectroscopic Telescope for Energetic Radiation* (*MonSTER*) mission concept – a potential NASA cube-sat

Member of the science team for the *DUET* mission, a NASA Small Explorer concept to search for UV transients in the gravitational wave era

Other Service:

Member of the Royal Astronomical Society

Scientific reviewer for Monthly Notices of the Royal Astronomical Society, the Astrophysical Journal, Astronomy and Astrophysics, Astronomiche Nachrichten, Astrophysics and Space Science, Nature Astronomy, Science, and Nature

Member of the SOC for the ULX pulsar workshop held at ESAC, Madrid (2018)

Member of the Equality & Diversity committee tasked with addressing issues related to diversity at the Institute of Astronomy (2018–2021)

Member of the Institute of Astronomy 'Self Assessment Team', supporting the submissions to the UK's Athena/SWAN program and the Institute of Physics/JUNO program, which assess progress towards improving gender balance (2021)

Member of the committee organising the Institute of Astronomy colloquium series (2018–2021)

Fellow of the Higher Education Authority (UK; awarded 2023)

Member of the SOC for the 'Extreme Accretion events in SMBHs' session at the 45th COSPAR Scientific Assembly (2024)

External reviewer for the ESPRIT postdoctoral fellowship program administered by the Austrian Science Fund (2024)

Grants, Awards & Honours

Awarded an STFC individual grant to support a 3-year PDRA (2023; ∼£465k)

Awarded an STFC Ernest Rutherford Fellowship (2016; ∼£495k)

Member of the *NuSTAR* Project Team recognised with a NASA Group Achievement Award (2015) for completion of the prime mission and significantly exceeding the requirements for mission success.

Awarded a NASA Postdoctoral Fellowship (2014; ∼$400k)

Member of the *NuSTAR* Science Team recognised with a NASA Group Achievement Award (2014) for groundbreaking discoveries in high-energy astrophysics.

Member of the *NuSTAR* Commissioning/Operations Team recognised with a NASA Group Achievement Award (2013) for successful commencement of the science program

Supervision of Research Students

Supervisor for a masters student (Ms. Gopika Sudhish) and 2 bachelors students (Ms. Chloe Bones, Mr. Adam Feasey; Hertfordshire, 2024–2025)

Supervisor for 2 masters students (Ms. Susmitha Prabhu, Mr. Vishnu Sasidharan) and 1 bachelors student (Mr Jon McTait; Hertfordshire, 2023–2024)

PhD supervisor for Ms. Athulya Madathil-Pottayil (Hertfordshire; 2022–present), resulting in 1 first author paper to date (Madathil-Pottayil et al. 2024)

Supervisor for 2 masters students (Mr. Andrew Scannell, Mr. Ibrahim Shawki; Hertfordshire, 2022–2023)

Supervisor for 2 summer research students (Mr. Akshay Robert, Mr. Andrea Sante; Cambridge, 2021)

Supervisor for a group of 3 summer research students (Mr. Finn Roper, Mr. Harry Gully, Ms. Nency Patel; Cambridge, 2020)

Part III (masters) supervisor for Mr. Luke Timmons (Cambridge, 2019–20)

PhD co-supervisor for Dr. Peter Kosec (Cambridge, ongoing), resulting in 5 first author papers to date (Kosec et al. 2018a,b,c, 2020a,b)

Adviser for graduate research project with Ms. Nikita Kamraj (Caltech, 2018–19), resulting in 1 first author paper (Kamraj et al. 2019)

Part III (masters) supervisor for Mr. Steven Young (Cambridge, 2018–19)

Part III (masters) supervisor for Ms. Xiaoxi Song (Cambridge, 2017–18), resulting in 1 first author paper (Song et al. 2020)

PhD co-supervisor for Dr. Jiachen Jiang (Cambridge, 2017–19), resulting in 6 first author papers (Jiang et al. 2018a,b, 2019a,b,c,d)

PhD co-supervisor for Dr. Douglas Buisson (Cambridge, 2017–19), resulting in 3 first author papers (Buisson et al. 2018a,b, 2019)

Adviser for several graduate research projects with Ms. Yanjun Xu (Caltech, 2015–16), resulting in 2 first author papers (Xu et al. 2017a,b)

Undergraduate research project supervisor for Mr. Eric Mukherjee (Caltech, 2013–14), resulting in 1 first author paper (Mukherjee et al. 2015); awarded Caltech senior thesis prize

Teaching Experience

Lecturing:

3–4 years experience lecturing courses at various undergraduate levels, including:

- 1st year undergraduate: Special Relativity, nuclear physics & molecules (module lead); python programming
- 3rd year undergradute: cosmology (module lead); astronomical spectroscopy
- Masters: X-ray astronomy

Tutorials/Supervisions:

7+ years experience of small group teaching/tutor roles, including:

- Year Tutor for 3rd year undergraduates, providing academic and pastoral support for the entire year group (Hertfordshire; 2024–present)
- Tutor for 2nd year physics undergraduates (Hertfordshire; 2021–present)
- Supervisor for the Statistical Physics course, taught as part of the Part II (3^{rd} year undergraduate) Astrophysics course (Cambridge; 2008–2012)

Outreach Experience

University of Hertfordshire, UK 2021 – Present

Guest speaker at department-run open nights at the University's Bayfordbury teaching observatory.

Careers Day, Collyers Sixth Form College 2010 – Present

Speaker on the benefits offered by, and the opportunities available for, post-graduate study and careers in research.

Institute of Astronomy, UK 2008 – 2012, 2016–2021

Active participant in department open days, guest speaker at department-run public observing nights and at the student-run Cambridge University Astronomy Society.

Selected Talks

Given over 25 invited colloquia, seminars and talks at various institutions and international conferences, including:

"Ultraluminous X-ray Sources: The State of the Art" – *From the Dolomites to the Event Horizon VII*, review talk, July 2024, Sesto, Italy

"The Extremes of Accretion: ULXs and Super-Eddington Pulsars" – *Institute of Astronomy Colloquium Series*, Feb 2023, Cambridge, UK

"The Extremes of Accretion: ULXs and Super-Eddington Pulsars" – *IASF-Milano Colloquium (remote)*, Nov 2022, Milan, Italy

"Reflections on AGN Spectroscopy in the *NuSTAR* Era" – *COSPAR 44th Assembly*, review talk, July 2022, Athens, Greece

"10 Years of NuSTAR and Ultraluminous X-ray Sources" – *Ten Years of the High-Energy Universe in Focus*, review talk, June 2022, Cagliari, Italy

"ULXs in the *NuSTAR* Era: Broadband Spectroscopy" – *IASF Palermo Astrophysics Colloquium (remote)*, Apr 2021, Palermo, Italy

"The Extremes of Accretion: ULXs and Super-Eddington Pulsars" – *Harvard CfA High Energy Colloquium (remote)*, Feb 2021, Cambridge, USA

"Putting a Spin on Black Holes in the *NuSTAR* Era " – *Univ. Alabama Astrophysics Colloquium (remote)*, Feb 2021, Tuscaloosa, USA

"The Extremes of Accretion: ULXs and Super-Eddington Pulsars" – *Univ. Geneva Astrophysics Colloquium (remote)*, Nov 2020, Geneva, Switzerland

"The Extremes of Accretion: ULXs and Super-Eddington Pulsars" – *IRAP Astrophysics Colloquium (remote)*, May 2020, Toulose, France

"The Extremes of Accretion: ULXs and Super-Eddington Pulsars" – *Stanford Astrophysics Colloquium*, Feb 2020, Stanford, USA

"The Extremes of Accretion: ULXs and Super-Eddington Pulsars" – *MSSL Astrophysics Colloquium*, Nov 2019, MSSL, UK

"Ultraluminous X-ray Sources and *Athena*" – *Athena UK Consortium Meeting*, Sept 2019, MSSL, UK

"Relativistic reflection and the soft excess in Active Galactic Nuclei" – *From the Dolomites to the Event Horizon V*, review talk, July 2019, Sesto, Italy

"Ultraluminous X-ray Sources and Super-Eddington Pulsars" – *Radboud Astrophysics Colloquium*, Feb 2019, Nijmegen, The Netherlands

"Ultraluminous Pulsars: *NuSTAR*'s Discovery of a New Population of Neutron Stars Accreting Above the Eddington Limit" – *NASA/JPL Astrophysics Colloquium*, July, 2018, Pasadena, USA

"Ultraluminous X-ray Sources in the *NuSTAR* Era" – *16th Meeting of the High Energy Astrophysics Division*, review talk, Aug 2017, Sun Valley, USA

"Recent Highlights from Ultraluminous X-ray Sources" – *NuSTAR Science Meeting*, review talk, Nov 2016, Pasadena, USA

"*NuSTAR* Observations of V404 Cygni in Outburst" – *INTEGRAL 2015: The New High Energy Sky*, Oct 2015, Rome, Italy

"Ultraluminous X-ray Sources in the *NuSTAR* Era" – *From the Dolomites to the Event Horizon III*, invited review, July 2015, Sesto, Italy

"Results from *NuSTAR* on X-ray Binaries, ULXs and AGN" – *The Extremes of Black Hole Accretion*, review talk, June 2015, Madrid, Spain

"Results from the *NuSTAR* Black Hole Spin Program" – *MSSL Astrophysics Colloquium*, July 2014, MSSL, UK

"*NuSTAR* Results on Black Hole Spin" – *April Meeting of the American Physical Society*, review talk, Apr 2014, Savannah, USA

"The *NuSTAR* ULX Observing Program" – *13th Meeting of the High Energy Astrophysics Division - NuSTAR Special Session*, April 2013, Monteray, USA

"*NuSTAR:* Bringing the High Energy Universe into Focus" – *NASA/GSFC special seminar*, Jan 2013, Greenbelt, USA

Observing Time

Awarded ∼7 Ms of X-ray observing time as principle investigator, including:

X-ray Observations:

1.1 Ms VLP with *XMM-Newton* to study extreme outflows in ULXs (Co-PIs: C. Pinto, D. J. Walton, E. Kara, P. Kosec); *to be observed 2025–2026*

104 ks with *Swift* to monitor the ULX pulsar NGC 5907 ULX1 with the XRT; *to be observed 2024 – 2025*

Two 75+100 ks coordinated *XMM-Newton+NuSTAR* observations of the ULX pulsar NGC 5907 ULX1; *observed 2023/2024*

104 ks with *Swift* to monitor the ULX pulsar NGC 5907 ULX1 with the XRT; *to be observed 2023 – 2024*

Two 50+100 ks coordinated *XMM-Newton+NuSTAR* observations of the ULXs IC 5052 ULX and ESO 501-023 ULX; *observed 2022/2023*

Two 70+100 ks coordinated *XMM-Newton+NuSTAR* observations of the ULX pulsar NGC 5907 ULX1; *observed 2022/2023*

104 ks with *Swift* to monitor the ULX pulsar NGC 5907 ULX1 with the XRT; *observed 2022 – 2023*

70+150 ks coordinated *XMM-Newton+NuSTAR* observation of the bare AGN RBS 1124; *observed Dec 2021*

130+150 ks coordinated *XMM-Newton+NuSTAR* observation of the ULX NGC 5055 ULX1; *observed Dec 2021*

3×60 ks with *XMM-Newton* on the ULX pulsar NGC 5907 ULX1; *observed 2021*

104 ks with *Swift* to monitor the ULX pulsar NGC 5907 ULX1 with the XRT; *observed 2021 – 2022*

6×10 ks with *Chandra* to survey new galaxies for ULXs; *observed 2021*

4 × 25+50 ks observations with *XMM-Newton+NuSTAR* of the ULX Holmberg IX X-1; *observed Nov 2020*

35 ks with *Swift* to monitor potential ULX pulsar targets in the NGC 891 and NGC 2403 galaxies; *observed 2020 – 2021*

Coordinated *XMM-Newton+NuSTAR* (125+150 ks) observation of the type I Seyfert galaxy ESO 033-G002; *observed June 2020*

Coordinated *Chandra+NuSTAR* (50+50 ks) observation of the quadruply-lensed type II quasar 2MASS J1042; *observed Feb 2020*

Coordinated *XMM-Newton+NuSTAR* (100+100 ks) observation of the Seyfert I AGN PG 1426+015; *to be observed Jan 2020*

Coordinated *XMM-Newton+NuSTAR* (25+50 ks) observation of the quadruply-lensed type II quasar 2MASS J1042; *observed Nov 2019*

Coordinated *XMM-Newton+NuSTAR* (100+100 ks) observation of the ULX in NGC 7090; *observed Apr 2020*

Priority 1 *Chandra* Cool Targets program to perform ULX science by observing nearby galaxies; *Commenced Mar 2019, ongoing*

Coordinated *XMM-Newton+NuSTAR* (75+200 ks) observation of the Seyfert I AGN IRAS 09149–6206; *observed Aug/Sept 2018*

6×60 ks observations of the ULX pulsar NGC 5907 ULX1 with *XMM-Newton*; *observed throughout 2019–2020*

Coordinated *XMM-Newton+NuSTAR* (175+300 ks) observation of the Seyfert II AGN IRAS 00521–7054; *observed Oct 2017*

5×75 ks observations of the ULX NGC 1313 X-1 with *NuSTAR* to complement approved *XMM-Newton/Chandra* programs; *observed throughout 2017*

200 ks with *XMM-Newton* and 300 ks with *NuSTAR* on the ULX pulsar NGC 7793 P13; *observed throughout 2017/8*

Coordinated 260 ks *XMM-Newton+NuSTAR* observation of the Narrow Line Seyfert I AGN PG 1535+547; *observed Sept 2016*

100 ks on the intermediate mass black hole candidate M82 X-1 with *Chandra*, coordinated with *NuSTAR*; *observed Sept 2016*

40 ks observation with *XMM-Newton* of the extreme ULX Circinus ULX5; *observed Aug 2016*

200 ks coordinated observation of the ULX pulsar NGC 7793 P13 with *XMM-Newton* and *NuSTAR*; *observed May 2016*

50×2 ks snapshot observations with *Swift* to monitor the uniquely diverse ULXs in M 82; *observed throughout 2015/6*

220 ks coordinated observation of the active galaxy IRAS 13197-1627 with *XMM-Newton* and *NuSTAR*; *observed Jan 2016*

350 ks total *NuSTAR* exposure across the recent ourbursts from V404 Cygni; *observed throughout 2015/6*

4×50 ks coordinated *Suzaku*+*NuSTAR* observations of the extreme ULX Holmberg IX X-1; *observed throughout 2014/5*

100 ks on the ULX Holmberg II X-1 with *Suzaku*, to compliment the approved *NuSTAR* observation; *observed Sept 2013*

Other Wavelengths:

Three full nights with MOSFIRE on Keck to study NIR ULX counterparts (PI: D. J. Walton), *observed throughout 2013/4*

References

Prof. Andy Fabian, Univ. of Cambridge, +44 (0) 1223 337509, acf@ast.cam.ac.uk

Prof. Fiona Harrison, Caltech, +01 (626) 395-6601, fiona@srl.caltech.edu

Dr. Daniel Stern, NASA/JPL, +01 (818) 281-4697, daniel.k.stern@jpl.nasa.gov

Prof. Jon Miller, Univ. of Michigan, +01 (734) 764-4185, jonmm@umich.edu

Prof. Tim Roberts, Durham Univ., +44 (0) 1913 343767, t.p.roberts@dur.ac.uk

Prof. Chris Reynolds, Univ. of Cambridge, +44 (0) 1223 766668, csr12@ast.cam.ac.uk

Additional references available upon request.