

William Alston

Senior Lecturer in Data Science
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Module leader for data intensive research with applications across astrophysics, climate science and artificial intelligence. Astrophysicist with 14 years of experience working on understanding the most extreme objects in the universe: black holes and neutron stars, using time series analysis.

- Awarded £0.5 million of STFC astronomy grant funding
- Author of 60 refereed papers, 11 as first author (one single author), and two book chapters.
- Mentor of 3 PhD students, 6 graduate students and 6 under-graduate students.

Professional appointments

2023/01-present **Senior Lecturer in Data Science**
University of Hertfordshire, Centre for Astrophysics Research

2020/09-2023/01 **ESA Research Fellow**
ESAC, Madrid

2014/11-2020/08 **Post-Doctoral Research Associate**
Institute of Astronomy
University of Cambridge
2017-2020: ERC grant 340442: *Feedback*
2014-2017: EU FP7 project: *Strong Gravity*

Education

2010-2013 **Doctor of Philosophy (Ph.D.)**
Probing the black hole region in active galaxies using time delays
University of Leicester. Awarded: Feb 2014

2010 **Master of Physics with Astrophysics (MPhys)**
University of Sheffield

Telescope Time Awarded

PI	XMM-Newton A019	855 ks (largest program awarded this AO) <i>An unprecedented view of QPO phenomena with RE J1034+396</i>
	XMM-Newton DDT	100 ks <i>Understanding the X-ray QPO in the active galaxy MS 22549-3712</i>
	Liverpool Telescope Sem15A	31 hrs <i>Reverberation mass mapping the central black hole in RE J1034+396</i>
	XMM-Newton AO13	620 ks (largest program on an individual source this AO) <i>Understanding the X-ray Time delays in the NLS1: PG 1244+026</i>
Co-I	NuStar cycle 7	500 ks (+260 ks XMM) , PI Fabian. Timing studies of 1H 1934-063
	XMM-Newton A020	130 ks , PI Mallick, Constraining the inner disc of low mass AGN
	XMM-Newton AO15	1.5 Ms , PI Fabian. <i>Mapping the inner accretion ow of IRAS 13224</i>
	XMM-Newton AO17	700 ks , PI Pinto. <i>Exploring the ULXs in NGC 1313</i>
	XMM-Newton AO18	400 ks , PI Kara. <i>Disc & corona reverberation mapping in Mrk 335</i>

Select Talks

Invited: *X-ray Reverberation*. The X-ray Universe 2020, Noordwijk
QPOs across the mass range. Lorentz Centre meeting on Spectral-Timing, 2017
QPOs and X-ray reverberation in AGN. Strasbourg Observatory, May 2016

Contributed: *X-ray Reverberation mapping active galaxies, HEAD, Monterey, Feb 2019*
Probing the inner accretion region with a 2 Ms XMM obs. COSPAR, July 2018

Phase-resolving HFQPOs in AGN, X-ray Universe 2017, Rome, June 2017
The QPO-reverberation connection in AGN. Black Hole Accretion, Madrid, June 2015
QPOs in Active Galaxies. RAS meeting on Accretion States, London, Apr 2015

Press Releases/Media:

- ESA - [XMM-Newton maps black hole surroundings](#)
- National Geographic - [Astronomers just got a deep peek at a black hole](#)
- Phys.org – [Periodic dipping in an ultraluminous X-ray source](#)

Experience / Skills

- Time and frequency-domain signal processing, including Monte Carlo time series simulations
- Statistical analysis and interpretation, including Bayesian inference and Machine Learning
- **Computer software:** Python, IDL, R, LaTeX, Shell, HTML, XSPEC, STARLINK, IRAF
- **Multi-wavelength data reduction:** XMM-Newton (EPIC, OM, RGS), NICER, NuSTAR, Swift (XRT, UVOT), ASTROSAT, RXTE, Hubble (WFPC-2), LT (SPRAT, IO:O), JCMT (SCUBA-2), NTT (EMMI)

Teaching Experience

- Mathematics Course leader/lecturer (Leicester, 2011-2013): Years 1 & 2 iScience (Nat. Sci.)
- Supervising ESA trainees (2020-present)
- Supervising Ph.D students (IoA, 2013-2020)
- Final year undergraduate project supervisor (IoA, 2013-2020): 'Astrophysics project'
- Seminar/problems class Leader (Leicester, 2010-2013):
- Physics & Mathematics Laboratory demonstrator (Leicester, 2010-2013): Physics & Astronomy
- A-level physics tutor (2012-2013)

Affiliations

- *Athena* (satellite) working groups 2.3 and 2.4
- Strobe-X science working group member
- Fellow of the Royal Statistical Society (UK)
- Member of Astrostatistics & Astroinformatics Portal

Services to the community

- Journal/textbook referee for: MNRAS, ApJ, Astro. Nach., PASPJ, MPI, Taylor & Francis
- Telescope proposal reviewer (OTAC): *XMM-Newton*, Liverpool Telescope

Outreach

- Talk on accreting black holes, IoA observing evenings, Oct 2017
- Radio interview: From beer to black holes Cambridge 105 FM (Sep 2015)
- Astronomy open day for Cambridge Science Festival 2014, 2015
- Public talk on black holes at the Wunderkammer improv show, London, Aug 2014.
- Chairing the expert speaker session for BBC Stargazing Live 2013 at University of Leicester
- Talk on studying physics and astronomy at university to GCSE and A-level students

Other relevant experience

- 50hr observation experience (5 nights) at JCMT, Mauna Kea, Hawaii (May 2012)
- Experience with 13", 16" and 20" teaching telescopes (Cambridge, Leicester and Sheffield)
- Organiser for internal astronomy seminars at Leicester (2011-2013)
- *Unconscious Bias* training course certificate (University of Cambridge)
- Postgraduate training courses, including 'Scientific Inference' and 'Numerical Methods'
- UCAS open day tours of the Physics and Astronomy department and Space Research Centre

References: Available on request

Publication list – William N. Alston

10 first author (1 single author), 50 co-author, 2 textbook chapter contributions.
h-index of 26 (24 without self-citations).

ADS link:

[https://ui.adsabs.harvard.edu/search/q=author%3A\(%22Alston%2C%20W%22\)&sort=date%20desc%2C%20bibcode%20desc&p =0](https://ui.adsabs.harvard.edu/search/q=author%3A(%22Alston%2C%20W%22)&sort=date%20desc%2C%20bibcode%20desc&p =0)

First author papers

(10) Quasi-periodic dipping in the ultraluminous X-ray source, NGC 247 ULX-1

Alston, Pinto, Barret, D'Ai, Del Santo, Earnshaw, Fabian, Fuerst, Kara, Kosec, Middleton, Parker, Pintore, Robba, Roberts, Sathyaprakash, Walton, Ambrosi, 2021, MNRAS, 505, 3722. <https://arxiv.org/abs/2104.11163>

(9) A dynamic black hole corona in an active galaxy through X-ray reverberation mapping

Alston, Fabian, Kara, Dovciak, Pinto, Jiang, Middleton, Parker, Miniutti, Walton, Wilkins, Buisson, Caballero-Garcia, Cackett, De Marco, Gallo, Lohfink, Reynolds, Uttley, Young & Zoghbi *Nature Astronomy*, 2020, <https://www.nature.com/articles/s41550-019-1002-x>

(8) Non-stationary variability in accreting compact objects

Alston, 2019, MNRAS, 485, 260. <https://arxiv.org/abs/1902.03036>

(7) The remarkable X-ray variability of IRAS 13224-3809 I: the variability process

Alston, Fabian, Buisson, Kara, Parker, Lohfink, Uttley, Wilkins, Pinto, De Marco, Cackett, Middleton, Walton, Reynolds, Jiang, Gallo, Zoghbi, Miniutti, Dovciak & Young, 2019, MNRAS, 482, 2088. <https://arxiv.org/abs/1803.10444>

(6) Quasi periodic oscillations in active galactic nuclei

Alston, Fabian, Markeviciute, Parker, Middleton & Kara, 2016, *Astro. Nach.*, 337, 417. <https://arxiv.org/abs/1510.01111>

(5) Discovery of a ~2 hr high frequency X-ray QPO and iron K alpha reverberation in MS 2254.9

Alston, Parker, Markeviciute, Fabian, Middleton, Lohfink, Kara & Pinto, 2015, MNRAS, 449, 467. <https://arxiv.org/abs/1411.0684>

(4) Detection of a QPO in five XMM-Newton observations of RE J1034+396

Alston, Markeviciūtė, Kara, Fabian & Middleton, 2014, MNRAS, 445, 16. <https://arxiv.org/abs/1407.7657>

(3) X-ray time delays in the narrow line Seyfert 1 galaxy PG 1244+026

Alston, Done & Vaughan, 2014, MNRAS, 439, 1548. <https://arxiv.org/abs/1311.5165>

(2) The flux-dependent X-ray time lags in NGC 4051

Alston, Vaughan & Uttley, 2013, MNRAS, 435, 1511. <https://arxiv.org/abs/1307.6371>

(1) Ultraviolet and X-ray variability of NGC 4051 over 45 days with XMM-Newton and Swift

Alston, Vaughan & Uttley, 2013, MNRAS, 429, 75. <https://arxiv.org/abs/1210.8329>

Textbooks

Fundamental Concepts in X-ray Astronomy (Springer)

2020, Springer. <https://www.springer.com/gp/book/9789811563362>

I contributed chapter 7 on time series analysis methods and their application to accretion physics

Handbook of X-ray and Gamma-ray Astrophysics (Springer)

My contribution is a chapter on the close environments of Active Galaxies

<https://ui.adsabs.harvard.edu/abs/2022arXiv220611790A/abstract>

Coauthor papers (* indicates major contribution)

- (40) X-ray Reverberation Mapping of Ark 564 using Gaussian Process Regression**
Lewin, Kara, Wilkins, Mastroserio, García, Zhang, Alston, Connors, Dauser, Fabian, Ingram, Jiang, Lohfink, Lucchini, Reynolds, Tombesi, van der Klis, Wang
2022, ApJ, in press, <https://ui.adsabs.harvard.edu/abs/2022arXiv221001810L/abstract>
- (39) XMM-Newton observations of the narrow-line Seyfert 1 galaxy IRAS 13224-3809: X-ray spectral analysis II**
Jiang, Dauser, Fabian, Alston, Gallo, Parker, Reynolds
2022, MNRAS, 514, 1107. <https://ui.adsabs.harvard.edu/abs/2022MNRAS.514.1107J/abstract>
- (38) High-density disc reflection spectroscopy of low-mass active galactic nuclei**
Mallick, Fabian Garcia, Alston, et al
2022, MNRAS, 513, 4361. <https://ui.adsabs.harvard.edu/abs/2022MNRAS.513.4361M/abstract>
- (37) Ejection-accretion connection in NLS1 AGN 1H 1934-063**
Xu, Pinto, Kara, Masterson, Garcia, Fabian, Parker, Barret, Alston, Cusumano
2022, MNRAS, 513, 191. <https://ui.adsabs.harvard.edu/abs/2022MNRAS.513.1910X/abstract>
- (36*) Evidence for a compact object in the aftermath of the extragalactic transient AT2018cow**
Pasham, Ho, Alston, et al
2022, Nat. Ast. 6, 249. <https://ui.adsabs.harvard.edu/abs/2022NatAs...6..249P/abstract>
- (35) Extreme relativistic reflection in the active galaxy, ESO 033-G002**
Walton, Baloković, Fabian, Gallo, Koss, Nardini, Reynolds, Ricci, Stern, Alston, Dauser, García, Kosec, Reynolds, Harrison, Miller
2021, MNRAS, 505, 1557. <https://ui.adsabs.harvard.edu/abs/2021MNRAS.506.1557W/abstract>
- (34*) XMM-Newton campaign on the ultraluminous X-ray source NGC 247 ULX-1: outflows**
Pinto, Soria, Walton, D'Ai, Pintore, Kosec, Alston, Fuerst, Middleton, Roberts, Del Santo, Barret, Ambrosi, Robba, Earnshaw, Fabian
2021, MNRAS, *sub*, <https://arxiv.org/abs/2104.11164>
- (33) Modelling the Multiwavelength Variability of Mrk 335 using Gaussian Processes**
Griffiths, Jiang, Buisson, Wilkins, Gallo, Ingram, Lee, Grupe, Kara, Parker, Alston, Bourached, Cann, Young, Komossa
2020, ApJ, in press, <https://arxiv.org/abs/2103.06838>
- (32*) Discovery of soft and hard X-ray time lags in low-mass AGNs**
Mallick, Wilkins, Alston, Markowitz, De Marco, Parker, Lohfink, Stalin,
2020, MNRAS, 503, 3775, <https://arxiv.org/abs/2101.09594>
- (31) Modelling X-ray RMS spectra II: the ultra-fast outflow of PDS 456**
Härer, L.; Parker, M. L.; Joyce, A.; Igo, Z.; Alston, W. N.; Fürst, F.; Lobban, A. P.; Matzeu, G. A.; Reeves, J. N.
2020, MNRAS, 500, 4506, <https://arxiv.org/pdf/2011.06472.pdf>
- (30*) A full characterization of the supermassive black hole in IRAS 09149-6206**
Walton, D. J.; Alston, W. N.; Kosec, P.; Fabian, A. C.; Gallo, L. C.; Garcia, J. A.; Miller, J. M.; Nardini, E.; Reynolds, M. T.; Ricci, C.; Stern, D.; Dauser, T.; Harrison, F. A.; Reynolds, C. S.
2020, MNRAS, 499, 1480. <https://arxiv.org/pdf/2009.10734.pdf>
- (29) Detection of a possible multiphase ultra-fast outflow in IRAS 13349+2438 with NuSTAR and XMM-Newton**
Parker, M. L.; Matzeu, G. A.; Alston, W. N.; Fabian, A. C.; Lobban, A.; Miniutti, G.; Pinto, C.; Santos-Lleó, M.; Schartel, N.
2020, MNRAS, 498, 140. <https://arxiv.org/pdf/2008.05965.pdf>
- (28) The first broad-band X-ray view of the narrow-line Seyfert 1 Ton S180**
Matzeu, G. A.; Nardini, E.; Parker, M. L.; Reeves, J. N.; Braitto, V.; Porquet, D.; Middei, R.; Kammoun, E.; Lusso, E.; Alston, W. N.; et al
2020, MNRAS, 497, 2352. <https://arxiv.org/pdf/2007.06575.pdf>

(27) Characterizing continuum variability in the radio-loud narrow-line Seyfert 1 galaxy IRAS 17020+4544

Gonzalez, A. G.; Gallo, L. C.; Kosec, P.; Fabian, A. C.; Alston, W. N.; Berton, M.; Wilkins, D. R. 2020, MNRAS, 496, 3708. <https://arxiv.org/pdf/2006.09330.pdf>

(26) Blueshifted absorption lines from X-ray reflection in IRAS 13224-3809

Fabian, A. C.; Reynolds, C. S.; Jiang, J.; Pinto, C.; Gallo, L. C.; Parker, M. L.; Lasenby, A. N.; Alston, W. N.; Buisson, D. J. K.; Cackett, E. M.; De Marco, B.; Garcia, J.; Kara, E.; Kosec, P. 2020, MNRAS, 493, 2518, <https://arxiv.org/abs/2002.06388>

(25*) Searching for Ultra-fast Outflows in AGN using Variability Spectra

Igo, Parker, Matzeu, Alston, Alvarez Crespo, Buisson, Fürst, Joyce, Mallick, Schartel, Santos-Lleó 2020, MNRAS, 493, 1088. <https://arxiv.org/abs/2001.08208>

(24*) Modelling X-ray rms spectra I: intrinsically variable AGN

Parker, Alston, Igo, Fabian 2020, MNRAS, 492, 1363. <https://arxiv.org/pdf/1910.12808.pdf>

(23*) NuSTAR reveals the hidden nature of SS433

Middleton, Walton, Alston, T. Dauser, S. Eikenberry, Y-F Jiang, A. C. Fabian, F. Fuerst, M. Brightman, H. Marshall, M. Parker, C. Pinto, F. A. Harrison, M. Bachetti, D. Altamirano, A. J. Bird, MNRAS, <https://arxiv.org/abs/1810.10518>

(22) The Unusual Broadband X-ray Spectral Variability of NGC 1313 X-1 seen with XMM-Newton, Chandra and NuSTAR

Walton, Pinto, WA et al 2019, MNRAS, 494, 6012. <https://arxiv.org/pdf/1911.09622.pdf>

(21) Discovery of a soft X-ray lag in the Ultraluminous X-ray Source NGC 1313 X-1

Kara, E.; Pinto, C.; Walton, D. J.; Alston, W. N.; Bachetti, M.; Barret, D.; Brightman, M.; Canizares, C. R.; Earnshaw, H. P.; Fabian, A. C.; Furst, F.; Kosec, P.; Middleton, M. J.; Roberts, T. P.; Soria, R.; Tao, L.; Webb, N. A. (2019), MNRAS, 491, 5172 <https://arxiv.org/pdf/1911.09582.pdf>

(20) XMM-Newton Campaign On Ultraluminous X-ray Source NGC 1313 X-1: Wind vs. State Variability

Pinto, Walton, D. J.; Kara, E.; Parker, M. L.; Soria, R.; Kosec, P.; Middleton, M. J.; Alston, W. N.; Fabian, A. C.; Guainazzi, M.; Roberts, T. P.; Fuerst, F.; Earnshaw, H. P.; Sathyaprakash, R.; Bar 2019, MNRAS, 492, 4646 <https://arxiv.org/pdf/1911.09568.pdf>

(19) The discovery of weak coherent pulsations in the ultraluminous X-ray source NGC 1313 X2

Sathyaprakash, Roberts, Walton, Fuerst, Bachetti, Pinto, Alston, Earnshaw, Fabian, Middleton & Soria, 2019, MNRAS, 488, 35. <https://arxiv.org/abs/1906.00640>

(18*) A high-density relativistic reflection origin for the soft and hard X-ray excess emission from Mrk 1044

Mallick, Alston, Parker, Fabian, Pinto, Dewangan, Markowitz, Gandhi, Kembhavi & Misra, 2018, MNRAS, 479, 615. <https://arxiv.org/abs/1804.02703>

(17*) The 1.5 Ms Observing Campaign on IRAS 13224-3809: X-ray Spectral Analysis I

Jiang, Parker, Fabian, Alston, Buisson, Cackett, Chiang, Dauser, Gallo, García, Harrison, Lohfink, De Marco, Kara, Miller, Miniutti, Pinto, Walton & Wilkins, 2018, MNRAS, 477, 3711. <https://arxiv.org/abs/1804.00349>

(16*) Ultrafast outflows disappear in high radiation fields

Pinto, Alston, Parker, Fabian, Gallo, Buisson, Walton, Kara, Jiang, Lohfink & Reynolds, 2018, MNRAS, 476, 1021. <https://arxiv.org/abs/1708.09422>

(15*) Is there a UV/X-ray connection in IRAS 13224-3809?

Buisson, Lohfink, Alston, Cackett, Chiang, Dauser, De Marco, Fabian, Gallo, García, Jiang, Kara, Middleton, Miniutti, Parker, Pinto, Uttley, Walton & Wilkins 2018, MNRAS, 475, 2306. <https://arxiv.org/abs/1712.06606>

- (14*) Revealing the ultra-fast outflow in IRAS 13224-3809 through spectral variability**
Parker, Alston, Buisson, Fabian, Jiang, Kara, Lohfink, Pinto & Reynolds
2017, MNRAS, 469, 1553. <https://arxiv.org/abs/1704.05545>
- (13*) From ultraluminous X-ray sources to ultraluminous supersoft sources: NGC 55 ULX**
Pinto, Alston, Soria, Middleton, Walton, Sutton, Fabian, Earnshaw, Urquhart, Kara & Roberts
2017, MNRAS, 468, 2865. <https://arxiv.org/abs/1612.05569>
- (12*) The response of relativistic outflowing gas to the inner accretion disk of a black hole**
Parker, Pinto, Fabian, Lohfink, Buisson, Alston, Kara, Cackett, Chiang, Dauser, De Marco, Gallo, Garcia, Harrison, King, Middleton, Miller, Miniutti, Reynolds, Uttley, Vasudevan, Walton, Wilkins & Zoghbi, 2017, Nature, 543, 83. <https://arxiv.org/abs/1703.00071>
- (11*) The Future of X-ray Reverberation from AGN**
Fabian, Alston, Cackett, Kara, Uttley & Wilkins,
2016, Astro. Nach., 338, 269. <https://arxiv.org/abs/1611.06909>
- (10*) Ultraviolet and X-ray variability of active galactic nuclei with Swift**
Buisson, Lohfink, Alston & Fabian
2016, MNRAS, 464, 3194. <https://arxiv.org/abs/1609.08638>
- (9*) A global look at X-ray time lags in Seyfert Galaxies**
Kara, Alston, Fabian, Cackett, Uttley, Reynolds & Zoghbi, 2016, MNRAS, 462, 511.
<https://arxiv.org/abs/1605.02631>
- (8*) False periodicities in quasar time-domain surveys**
Vaughan, Uttley, Markowitz, Huppenkothen, Middleton, Alston, Scargle & Farr, 2016, MNRAS, 461, 3145. <https://arxiv.org/abs/1606.02620>
- (7*) A global look at X-ray time lags in Seyfert Galaxies**
Kara, Alston & Fabian, 2016, Astro. Nach., 337, 473. <https://arxiv.org/abs/1605.02631>
- (6*) The Rhythm of Fairall 9. I. Observing the Spectral Variability with XMM-Newton and NuSTAR**
Lohfink, Reynolds, Pinto, Alston, Boggs, Christensen, Craig, Fabian, Hailey, Harrison, Kara, Matt, Parker, Stern, Walton & Zhang, 2016, ApJ, 821, 11. <https://arxiv.org/abs/1602.05589>
- (5) NuSTAR and Suzaku observations of the hard state in Cygnus X-1: locating the inner accretion disk**
Parker, Tomsick, Miller, Yamaoka, Lohfink, Nowak, Fabian, Alston, Boggs, Christensen, Craig, Fuerst, Gandhi, Grefenstette, Grinberg, Hailey, Harrison, Kara, King, Stern, Walton, Wilms & Zhang, 2015, ApJ, 808, 9. <https://arxiv.org/abs/1506.00007>
- (4*) Revealing the X-ray variability of AGN with principal component analysis**
Parker, Fabian, Matt, Koljonen, Kara, Alston, Walton, Marinucci & Risaliti, 2015, MNRAS, 447, 72.
<https://arxiv.org/abs/1411.4054>
- (3*) X-ray time delays from the Seyfert 2 galaxy IRAS 18325-5926**
Lobban, Alston & Vaughan, 2014, MNRAS, 445, 3229. <https://arxiv.org/abs/1409.3189>
- (2*) The changing X-ray time lag in MCG-6-30-15**
Kara, Fabian, Marinucci, Matt, Parker, Alston, Brenneman, Cackett & Miniutti, 2014, MNRAS, 445, 56. <https://arxiv.org/abs/1408.5051>
- (1*) A non-thermal study of the brightest cluster galaxy NGC 1275 - the Gamma-Radio connection**
Dutson, Edge, Hinton, Hogan, Gurwell & Alston, 2014, MNRAS, 442, 2048.
<https://arxiv.org/abs/1405.3647>