

Aarran Shaw

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EDUCATION AND PROFESSIONAL EXPERIENCE

November 2016 - present: Postdoctoral Research Fellow

University of Alberta, Edmonton, Canada

Postdoctoral Supervisor: Prof. Craig O. Heinke

September 2012 - October 2016: PhD in Astrophysics

University of Southampton, Southampton, UK

Thesis title: Multi-wavelength Observations of Galactic Black Hole X-ray Transients (defended September 2016)

Supervisor: Prof. Philip A. Charles

September 2007 - July 2012: MPhys (with BSc) in Physics with Astrophysics (with Research Placement)

University of Leeds, Leeds, UK

Graduated with First Class Honours

RESEARCH INTERESTS

Accretion physics; Black holes; Neutron stars; White dwarfs; X-ray binaries; Cataclysmic Variables; Timing and variability; Multi-wavelength observational astronomy

TEACHING EXPERIENCE

September 2012 - October 2016: Mayflower Scholar (Teaching Assistant and demonstrator)

University of Southampton, Southampton, UK

- 1st year course: Energy and Matter (also delivered revision lectures)
- 1st year course: Motion and Relativity
- 1st year course: Physics Skills (Experimental Labs)
- 2nd year course: Quantum Physics of Matter
- 2nd year course: Classical Mechanics
- 2nd year course: Physics from Evidence (Python labs)
- 3rd/4th year course: Computer Techniques in Physics (Advanced Python labs)

PUBLIC ENGAGEMENT

November 2016 - present:

- 10 September 2018, public talk: “Black holes don’t suck,” Royal Astronomical Society of Canada regular meeting
- 16 May 2018, public talk: “Radio Astronomy through the ages,” Northern Alberta Radio Club monthly meeting
- 16 March 2017, public talk: “Life after death: The violent nature of black holes,” University of Alberta public observing evening
- Interview for “Astro 101: Black Holes” online course, short videos discussing black holes and neutron stars available on YouTube

September 2012 - October 2016: Team member, ‘Southampton Astrodome’

Inflatable planetarium shows at primary and secondary schools, University open days, BBC stargazing live open evenings. Other duties included leading astronomy demonstrations at National Science Week at Winchester Science Centre.

AWARDS

July 2009 - August 2011: Summer Research Placement, Universities of Leeds and Leicester

Awarded stipend from University of Leeds Physics department to conduct a Research Placement for three years every summer. I gained valuable experience with observational astronomy in a research environment before commencing my PhD. In 2011 I studied Pulsar Wind Nebulae with the Fermi Gamma-ray Space Telescope at the University of Leicester.

PROFESSIONAL MEMBERSHIP

Fellow of the Royal Astronomical Society (RAS)

Member of the American Astronomical Society (AAS)

Member of Canadian Astronomical Society Société Canadienne d’Astronomie (CASCA)

OTHER RELEVANT EXPERIENCE

Referee for Monthly Notices of the Royal Astronomical Society

Reviewer for the Swift Time Allocation Committee

Reviewer for the Chandra Time Allocation Committee

Reviewer for the NuSTAR Time Allocation Committee

LOC for CASCA 2017, 29 May-1 June 2017, Edmonton, AB, Canada

COMPUTING SKILLS

Data reduction packages: XSELECT, IRAF/pyRAF, Chandra CIAO, XMM-Newton SAS, ESOREX/REFLEX

Astronomy analysis software: HEASOFT/FTOOLS (including XSPEC and XRONOS), Starlink, DS9, T. R. Marsh’s software (Molly, Doppler), AstrOmatic software (SExtractor, SCAMP, SWarp), pgplot, GNUplot

Programming: Python, bash, TCL, limited html

Applications: Google docs, MS Office, iWork, LaTeX

Operating Systems: Linux, macOS, Windows

CONFERENCE PRESENTATIONS AND INVITED TALKS

Invited talk: *The Swift Bulge Survey - in search of the faintest X-ray transients*: SRL Seminar, 26 September 2017, Caltech, Pasadena, CA, USA

Contributed talk: *Swift J1753.5-0127 - the black hole that just wouldn’t stay quiet*: Time for Accretion, 6-10 August 2018, Sigtuna, Sweden

Contributed talk: *Measuring the masses of Intermediate Polars with NuSTAR*: COSPAR 2018, 14-22 July 2018, Pasadena, CA, USA

Contributed talk: *The radius of the quiescent neutron star in M13*: COSPAR 2018, 14-22 July 2018, Pasadena, CA, USA

Contributed talk: *The Swift Bulge Survey - in search of the faintest X-ray transients*: 16th HEAD Divisional Meeting, 20-24 August 2017, Sun Valley, ID, USA

Contributed talk: *The Swift Bulge Survey - in search of the faintest X-ray transients*: CASCA 2017, 29 May-1 June 2017, University of Alberta, Edmonton, AB, Canada

Contributed talk: *On the orbital period of MAXI J1305-704*: 7 years of MAXI: Monitoring X-ray Transients, 5-7 December 2016, RIKEN, Tokyo, Japan

Contributed talk: No evidence for a low mass black hole in *Swift J1753.5–0127*: New Results in X-ray Astronomy, 28 September 2016, MSSL, Dorking, UK

Contributed talk: *An unusual soft state in Swift J1753.5–0127*: New Results in X-ray Astronomy, 28 October 2015, University of Leicester, Leicester, UK

Contributed talk: *The curious new state of Swift J1753.5–0127*: The Extremes of Black Hole Accretion, 8-10 June 2015, ESAC, Madrid, Spain

Contributed talk: *A 420-day X-ray/optical modulation and extended X-ray dips in the short-period transient Swift J1753.5–0127*: New Results in X-ray Astronomy, 16 September 2013, University of Southampton, Southampton, UK

OBSERVING PROPOSALS

Observing proposal summary:

Accepted observing proposals as PI: 23

Accepted observing proposals as co-I: 27

Selection of accepted observing programmes as PI:

The nature of the cataclysmic variable population in the globular cluster NGC 6397

2018-2019; 100ks; NuSTAR

100ks NuSTAR observation of NGC 6397 in order to characterize the spectrum of the CV population. If they are magnetic CVs then we will be able to derive the average mass of CVs in NGC 6397.

The decade long wait is over: our first look at the companion star in the black hole X-ray binary Swift J1753.5-0127

2018; 10.8hr; Gemini GMOS-S

>10 hours of Gemini GMOS i-band observations of the black hole Swift J1753.5-0127 to measure the ellipsoidal modulation, with a view to measuring the black hole mass

WIRCAM NIR follow-up of very faint X-ray transients discovered by Swift

2017-2018; 2.82hr per semester (two semesters), CFHT WIRCAM

Two target-of-opportunity triggers to observe the fields of two new faint X-ray transients discovered by Swift and identify their near-infrared counterparts in preparation for follow-up with larger telescopes

Measuring White Dwarf masses with NuSTAR: A Legacy Survey

2017-; 985ks; NuSTAR

Legacy survey designed to measure the hard X-ray spectrum of 25 magnetic CVs in order to derive their masses

Determining System Parameters of LMXB Transients during Outburst

2015-2018; 12hr; Liverpool Telescope FRODOSpec

Long-running target-of-opportunity programme to spectroscopically determine the mass of a new bright X-ray transient using the Bowen fluorescence technique. Recently triggered on the bright black hole candidate MAXI J1820+070

The orbital solution of Swift J1910.2-0546

2015; 7 nights; SAAO 1.9m Radcliffe telescope (visitor mode)

A week of photometry of the black hole candidate Swift J1910.2-0546 to determine its orbital period from the ellipsoidal modulation.

PUBLICATIONS

Publication record summary:

Refereed publications as first author: 7

Refereed publications as co-author: 8

Non-refereed publications as first author: 10

Non-refereed publications as co-author: 21

h-index: 7

Refereed publications as first author [citations]:

A. W. Shaw, B. E. Tetarenko, G. Dubus, T. Dinçer, J. A. Tomsick, P. Gandhi, R. M. Plotkin, D. M. Russell: *The Curious Case of Swift J1753.5-0127: A Black Hole Low-mass X-ray Binary Analogue to Z Cam Type Dwarf Novae*, 2019, MNRAS, 482, 1840 [0]

A. W. Shaw, C. O. Heinke, A. W. Steiner, S. Campana, H. N. Cohn, W. C. G. Ho, P. M. Lugger, M. Servillat: *The radius of the quiescent neutron star in the globular cluster M13*, 2018, MNRAS, 476, 4713 [2]

A. W. Shaw, C. O. Heinke, K. Mukai, G. R. Sivakoff, J. A. Tomsick, V. Rana: *Measuring the masses of Intermediate Polars with NuSTAR: V709 Cas, NY Lup and V1223 Sgr*, 2018, MNRAS, 476, 554 [2]

A. W. Shaw, C. O. Heinke, N. Degenaar, R. Wijnands, R. Kaur, L. M. Forestell: *Near-infrared counterparts of three transient very faint neutron star X-ray binaries*, 2017, MNRAS, 471, 2508 [0]

A. W. Shaw, P. A. Charles, J. Casares, J. V. Hernández Santisteban: *No evidence for a low-mass black hole in Swift J1753.5-0127*, 2016, MNRAS, 463, 1314 [5]

A. W. Shaw, P. Gandhi, D. Altamirano, P. Uttley, J. A. Tomsick, P. A. Charles, F. Fürst, F. Rahoui, D. J. Walton: *A low-luminosity soft state in the short period black hole X-ray binary Swift J1753.5-0127*, 2016, MNRAS, 458, 1636 [7]

A. W. Shaw, P. A. Charles, A. J. Bird, R. Cornelisse, J. Casares, F. Lewis, T. Muñoz-Darias, D. M. Russell, C. Zurita: *A 420-day X-ray/optical modulation and extended X-ray dips in the short-period transient Swift J1753.5-0127*, 2013, MNRAS, 433, 740 [14]

Refereed Publications as co-author [citations]:

D. Mata Sánchez, T. Muñoz-Darias, J. Casares, P. A. Charles, M. Armas Padilla, J. A. Fernández-Ontiveros, F. Jiménez-Ibarra, P. G. Jonker, M. Linares, M. A. P. Torres, **A. W. Shaw**, P. Rodríguez-Gil, T. van Grunsven, P. Blay, M. D. Caballero-García, A. Castro-Tirado, P. Chinchilla, C. Farina, A. Ferragamo, F. Lopez-Martinez, J. A. Rubiño-Martín, L. Suárez-Andrés: *The 1989 and 2015 outbursts of V404 Cygni: a global study of wind-related optical features*, 2018, MNRAS, 481, 2646 [0]

A. J. Tetarenko, A. Bahramian, R. Wijnands, C. O. Heinke, T. J. Maccarone, J. C. A. Miller-Jones, J. Strader, L. Chomiuk, N. Degenaar, G. R. Sivakoff, D. Altamirano, A. T. Deller, J. A. Kennea, K. L. Li, R. M. Plotkin, T. D. Russell, **A. W. Shaw**: *A radio frequency study of the accreting millisecond X-ray pulsar, IGR J16597- 3704, in the globular cluster NGC 6256*, 2018, ApJ, 854, 125 [0]

P. Gandhi, M. Bachetti, V. S. Dhillon, R. P. Fender, L. K. Hardy, F. A. Harrison, S. P. Littlefair, J. Malzac, S. Markoff, T. R. Marsh, K. Mooley, D. Stern, J. A. Tomsick, D. J. Walton, P. Casella, F. Vincentelli, D. Altamirano, J. Casares, C. Ceccobello, P. A. Charles, C. Ferrigno, R. I. Hynes, C. Knigge, E. Kuulkers, M. Pahari, F. Rahoui, D. M. Russell, **A. W. Shaw**: *An elevation of 0.1 light-seconds for the optical jet base in an accreting Galactic black hole system*, 2017, Nature Astronomy, 1, 859 [14]

R. M. Plotkin, J. Bright, J. C. A. Miller-Jones, **A. W. Shaw**, J. A. Tomsick, T. D. Russell, G. -B. Zhang, D. M. Russell, R. P. Fender, J. Homan, P. Atri, F. Bernardini, J. D. Gelfand, F. Lewis, T. M. Cantwell, S. H. Carey, K. J. B. Grainge, J.

Hickish, Y. C. Perrott, N. Razavi-Ghods, A. M. M. Scaife, P. F. Scott, D. J. Titterton: *Up and down the black hole radio/X-ray correlation: The 2017 mini-outbursts from Swift J1753.5–0127*, 2017, ApJ, 848, 92 [5]

F. Rahoui, J. A. Tomsick, P. Gandhi, P. Casella, F. Fürst, L. Natalucci, A. Rossi, **A. W. Shaw**, V. Testa, D. J. Walton: *The nova-like nebular optical spectrum of V404 Cygni at the beginning of the 2015 outburst decay*, 2017, MNRAS, 465, 4468 [9]

A. P. Rushton, **A. W. Shaw**, R. P. Fender, D. Altamirano, P. Gandhi, P. Uttley, P. A. Charles, M. Kolehmainen, G. E. Anderson, C. Rumsey, D. J. Titterton: *Disk-jet quenching of the Galactic black hole Swift J1753.5–0127*, 2016, MNRAS, 463, 628 [14]

P. Gandhi, S. P. Littlefair, L. K. Hardy, V. S. Dhillon, T. R. Marsh, **A. W. Shaw**, M. D. Caballero-Garcia, D. Altamirano, J. Casares, P. Casella, P. A. Charles, Y. Dallilar, S. Eikenberry, R. P. Fender, R. I. Hynes, C. Knigge, E. Kuulkers, K. Mooley, T. Muñoz-Darias, M. Pahari, F. Rahoui, D. M. Russell, J. V. Hernández Santisteban, T. Shahbaz, D. M. Terndrup, J. A. Tomsick, D. J. Walton: *Furiously fast and red: Sub-second optical flickering in V404 Cyg during the 2015 outburst peak*, 2016, MNRAS, 459, 554 [26]

F. Bernardini, D. M. Russell, **A. W. Shaw**, F. Lewis, P. A. Charles, K. I. I. Koljonen, J. P. Lasota, J. Casares: *Events leading up to the Jun 2015 outburst of V404 Cyg*, 2016, ApJ, 818, L5 [18]

Submitted publications:

P. R. Hebbbar, C. O. Heinke, G. R. Sivakoff, **A. W. Shaw**: *X-ray spectroscopy of the candidate AGN in Henize 2-10 and NGC 4178: Likely supernova remnants*, 2018, submitted to MNRAS

G.-B. Zhang, F. Bernardini, D. M. Russell, J. D. Gelfand, J.-P. Lasota, A. Al Qasim, A. AlMannaei, **A. W. Shaw**, F. Lewis, J. A. Tomsick, R. M. Plotkin, P. A. Charles, J. C. A. Miller-Jones, D. Maitra, J. Homan, P. Kobel, D. Perez, R. Doran: *Two bright mini-outbursts end the 12-year long activity of the black hole candidate Swift J1753.5-0127*, 2018, submitted to ApJ

Non-refereed publications (not including Astronomer's Telegrams):

A. W. Shaw, P. A. Charles, J. Casares, D. Steeghs: *The orbital period of MAXI J1305–704*, 2017, 7 years of MAXI: Monitoring X-ray Transients, proceedings, ed. M. Serino, M. Shidatsu, W. Iwakiri & T. Mihara, p. 45

P. A. Charles, **A. W. Shaw**, M. Coriat, P. Gandhi, L. J. Townsend, P. Woudt, J. Casares, M. M. Kotze, D. Steeghs, R. P. Fender, A. A. Zdziarski: *Multi-wavelength Studies of High Latitude Black Hole X-ray Transients*, 2015, Proceedings of the SALT Science Conference 2015, proceedings, ed. D.A.H. Buckley, & A.C. Schröder, id 23

A. W. Shaw, P. A. Charles, A. J. Bird, R. Cornelisse, J. Casares, V. S. Dhillon, R. P. Fender, M. Kolehmainen, F. Lewis, T. Muñoz-Darias, D. M. Russell, C. Zurita: *The Black Hole transient Swift J1753.5–0127 - A 420 day X-ray/optical modulation and extended X-ray dips*, 2014, Suzaku-MAXI 2014: Expanding the Frontiers of the X-ray Universe, proceedings, ed. M. Ishida, R. Petre & K. Mitsuda, p.214