

STEPHEN ALEXANDER WALKER

CURRICULUM VITAE

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EMPLOYMENT

NASA Goddard Space Flight Center – NASA Postdoctoral Program Fellow.

October 2016 - present

University of Cambridge – Postdoctoral researcher at the Institute of Astronomy.

February 2014 - September 2016

EDUCATION

University of Cambridge – **Ph.D** in Astronomy from the Institute of Astronomy

October 2010 - February 2014

Supervisor: Prof Andy Fabian

Thesis: *X-ray observations of the outskirts of galaxy clusters.*

University of Oxford – **Master's degree, Physics, First Class**

October 2006 - July 2010

Masters Supervisors: Dr Ryan Houghton and Prof Roger Davies

Thesis: *The fundamental plane of elliptical galaxies*

SELECTED AWARDS AND HONORS

- NASA Postdoctoral Program Fellowship (2016-present) - \$250,000
- Emsley Science Prize 2013/14 - awarded to the student achieving the highest mark or recommendation in Science at a postgraduate level at St Edmund's College, University of Cambridge.
- Science and Technology Facilities Council (STFC) PhD Studentship (2010-2014) - \$65,000
- Academic Scholarship, Merton College, University of Oxford, 2007, 2008, 2009 and 2010.

ACCEPTED OBSERVATION AND GRANT PROPOSALS

Summary: *>4.5Ms in observing time and >\$676,000 in funding across 26 programs, with >1.6Ms in observing time and >\$488,000 in funding across 13 programs as PI.*

Chandra as PI

- AO20 (2018), 190ks, Is there an enormous cold front at the virial radius of the Perseus cluster? **PI: S. A. Walker** (*\$93,760 funding*)
- AO20 (2018), 195ks, Probing within the Bondi radius of the ultramassive black hole in NGC 1600 **PI: S. A. Walker** (*\$82,840 funding*)

- AO19 (2017), 64ks, Unravelling gas clumping in the outskirts of the Perseus cluster. **PI: S. A. Walker** (*\$83,000 funding*)
- AO18 (2016), 190ks, A detailed study of the colossal 700 kpc radius cold front in the Perseus cluster. **PI: S. A. Walker**
- AO18 (2016), 40ks, 18800348, Unravelling the peculiar outskirts of the X-ray bright galaxy cluster PKS 0745-191. **PI: S. A. Walker**
- AO15 (2013), 100ks, Detecting the hot gaseous halo around an extremely massive and relativistic jet launching galaxy. **PI: S. A. Walker**
- AO14 (2012), 40ks, Joint Chandra and Suzaku exploration of the outskirts of the nearby, X-ray bright Centaurus cluster. **PI: S. A. Walker** (*\$23,000 funding*)

XMM-Newton as PI

- AO17 (2017), 82ks, Is there an enormous cold front at the virial radius of the Perseus cluster? **PI: S. A. Walker** (*\$70,737 funding*)
- AO16 (2016), 88ks, Exploring the halo around an extremely massive, jet launching spiral galaxy. **PI: S. A. Walker** (*\$55,000 funding*)

Suzaku as PI

- A10 (2015), 240ks, Complete coverage of the virial radius of the Perseus cluster. **Science-PI: S. A. Walker (with Chris Reynolds)**
- A10 (2015), 50ks, Reaching the virial radius in the X-ray bright group HCG 62. **PI: S. A. Walker**
- AO9 (2014), 120ks, Observations of the X-ray bright, nearby galaxy cluster Abell 3571 to the virial radius. **PI: S. A. Walker**
- AO9 (2014), 204ks, Observations of the X-ray bright, nearby Centaurus cluster to the virial radius. **Science-PI: S. A. Walker (with Chris Reynolds)** (*\$80,000 funding*)

Chandra as Co-I

- AO20 (2018), 36ks, The rare merging cluster SPT-CLJ2031-4037 - probing dark matter and ICM physics **PI: F. Hofmann** (*\$23,500 funding*)
- AO15 (2013), 500ks, Deep imaging and spectroscopy of the Centaurus cluster: metals and filaments **PI: J.S. Sanders** (*\$83,000 funding*)
- AO13 (2011), 500ks, Examining incredible structure in the core of the Coma cluster. **PI: J.S. Sanders** (*\$82,000 funding*)

Suzaku as Co-I

- AO9 (2014), 180ks, Using the Moon to determine the normalization of the Cosmic X-ray Background. **PI: Y. Ueda**
- AO9 (2014), 210ks, X-ray observations of the southern lobe of the nearest radio galaxy, Centaurus A **PI: C. Carilli**
- AO6 (2011), 90ks, Observations of the X-ray bright, nearby Centaurus cluster to the virial radius. **PI: A. C. Fabian**

XMM-Newton as Co-I

- AO17 (2018), 900ks, Mapping merger, sloshing and AGN-produced bulk motions in the Centaurus cluster **PI: J.S. Sanders**
- AO16 (2017), 388ks, Measuring sloshing, merging and feedback velocities in Centaurus and Virgo. **PI: J.S. Sanders**
- AO13 (2013), 100ks, Studying X-ray cooling in a luminous cluster with feedback

(PKS 0745-191). **PI: J.S. Sanders**

- AO13 (2013), 11ks, X-ray observations of the southern lobe of the nearest radio galaxy, Centaurus A. **PI: I. Stefan**

Hubble Space Telescope as Co-I

- AO23 (2015), 2 orbits, Bulge structure and kinematics in an extreme spiral galaxy hosting megaparsec-scale radio jets. **PI: Aaron Barth**
- AO22 (2014), 13 orbits, H-alpha Filaments and Feedback in NGC 4696 at the centre of the Centaurus cluster. **PI: A. C. Fabian**

Gemini Observatory as Co-I

- 2016, 6 hours, Bulge structure and kinematics in an extreme spiral galaxy hosting megaparsec-scale radio jets. **PI: Aaron Barth**

PRESS RELEASES

As first author:

- [Scientists suprised by relentless cosmic cold front](#)
-NASA Chandra press release, April 2018 - Walker et al. 2018 in *Nature Astronomy*
Covered by at least 17 news outlets, an altmetric of 157
- [Front cover of April 2018 edition of Nature Astronomy](#)
- [Scientists Find Giant Wave Rolling Through The Perseus Cluster](#)
-NASA press release, May 2017 - Walker et al. 2017
*Covered by at least 40 different news outlets (including for example the MailOnline, Forbes, BBC Sky at Night, Nature Astronomy, Physics World etc). The viewing figures for the press release on different platforms are:
Instagram >1.5 million, Youtube >208,000, NASA Facebook >125,000.
The paper has an altmetric of 464 (in the top 10 highest for MNRAS in 2017).*
- [APOD, May 4th 2017: The Perseus Cluster Waves](#)

As second author:

- [Tangled threads weave through cosmic oddity](#)
-ESA/Hubble press release, December 2016 - Fabian, Walker et al. 2016
- [APOD, December 7th 2016: NGC 4696: Filaments around a black hole](#)

As co-author:

- [NGC 4696: The Arrhythmic Beating of a Black Hole Heart](#)
-Chandra press release, April 2017 - Sanders et al. 2016
- [Clues to the Growth of the Colossus in Coma](#)
-NASA press release, September 2013 - Sanders et al. 2013

TEACHING EXPERIENCE

Research students supervised

- Tom Bamford (Oct 2015 - June 2016), Master's student. Project: *Understanding AGN feedback measurements with Chandra*. IoA, Cambridge.
- Stanislav Fort (Jun - Aug 2013), summer student. Project: *X-ray analysis of the galaxies in the cores of the Perseus and Coma clusters*. IoA, Cambridge.
- Peter Kosec (Jun - Aug 2013), summer student. Project: *Studying the X-ray*

emission from the filaments in the cores of galaxy clusters. IoA, Cambridge.

Teaching experience

- Tutor for third-year undergraduate Physical Cosmology course, University of Cambridge.

PEER REVIEW

- Referee for Nature, 2017-present
- Referee for The Astrophysical Journal (ApJ), 2013-present
- Referee for Astronomy and Astrophysics (A&A), 2018-present
- Referee for MNRAS, 2013-present
- Referee for PASJ, 2018-present
- Chandra Proposal Peer Review

OUTREACH

- Apr 2018 - Guest blog for NASAs Chandra X-ray observatory - [Perseus's Cosmic Dance Helps Reveal the Secrets of Galaxy Cluster Astrophysics](#)
- Feb 2018 - Guest blog for *Nature's* Astronomy Community - [Probing the ancient depths of the Perseus cluster](#)
- May 2017 - Twitter Q&A at NASA with the public for the Perseus cluster wave press release
- Mar 2016 - Presentation of X-ray Astronomy at the Cambridge Science Festival.
- Nov 2014 - Invited talk at Cambridge University Astronomical Society: '50 years of X-ray Astronomy'
- Mar 2011 - Presentation of the expanding universe at the Cambridge Science Festival.
- 2008-2010 - Committee member for Oxford University Space and Astronomical Society
- 2008-2010 - Committee member for Oxford University Physics Society

TALKS AND SEMINARS

Invited talks

- Nov 2018 - '*Unraveling the history of the Perseus cluster*'
High Energy Phenomena seminar, CfA Harvard
- Nov 2018 - '*The physics of galaxy cluster outskirts*'
Galaxies and Cosmology seminar, CfA Harvard
- Nov 2018 - '*Galaxy clusters*'
Physics seminar at University of Huntsville, Alabama
- Nov 2017 - '*Unraveling the physics of the ICM with cold fronts*'
ISSI Workshop, Bern, Switzerland
- July 2017 - '*Is there a giant 200,000 light year long wave in the Perseus cluster?*'
AstroCon DC, George Washington University, USA
- Nov 2016 - '*Galaxy clusters from the center to the edge*'

- JSI Mini-Symposium, University of Maryland, USA
- Mar 2015 - *‘Exploring the outskirts of galaxy clusters’*
SnowCluster - The Physics of Galaxy Clusters, USA
- May 2014 - *‘The outskirts of galaxy clusters’*
University of Maryland, USA
- Sep 2013 - *‘Cluster outskirts with Suzaku’*
Tokyo University of Science, Japan
- Sep 2013 - *‘X-ray exploration of cluster outskirts’*
Tokyo Metropolitan University, Japan
- Nov 2012 - *‘The outskirts of galaxy clusters with Suzaku’*
Galaxy Cluster Cosmology in the Real and Simulated Universe, Ringberg castle, Germany

Contributed talks

- Aug 2018 - *‘Galaxy cluster outskirts with AXIS’*
AXIS workshop, Washington DC
- Jun 2018 - *‘WHIM and galaxy cluster outskirts with AXIS’*
Alabama WHIM conference 2018
- Mar 2018 - *‘Unraveling the physics of the ICM with cold fronts’*
Snowcluster 2018
- Jan 2018 - *‘Is there a giant 200,000 light-year long wave in the Perseus cluster?’*
AAS meeting, Washington DC
- Jun 2017 - *‘Is there a giant Kelvin-Helmholtz instability in the Perseus cluster?’*
The X-ray Universe, Rome, Italy
- Jul 2016 - *‘Edge detection techniques in X-ray astronomy’*
National Astronomy Meeting 2016, Nottingham, UK
- Jun 2014 - *‘Exploring the outskirts of galaxy clusters’*
University of Cambridge, UK, Wednesday seminar speaker
- Sep 2013 - *‘Galaxy cluster outskirts’*
New Results in X-ray Astronomy 2013, University of Southampton, UK
- Sep 2013 - *‘Prospects for cluster outskirts with Astro-H’*
Astro-H Summer School, Tokyo
- May 2013 - *‘The outskirts of galaxy clusters with Suzaku’*
CfA Harvard, Galaxy Cluster Group, USA
- May 2013 - *‘Galaxy cluster outskirts in X-rays’*
MIT Kavli Institute, USA
- Sep 2012 - *‘The outer regions of galaxy clusters’*
New Results in X-ray Astronomy 2012, University of Leicester

SCIENCE STUDY TEAMS

- Member of the Athena topical panel, science working group 1.2: The astrophysics of galaxy groups and clusters.
- Member of the AXIS (Advanced X-ray Imaging Satellite) science team

- Member of the Lynx science working group ‘Evolution of Structure and AGN populations’

DATA AND OBSERVING EXPERIENCE

Data Reduction and Analysis

- Chandra ACIS data analysis - extensive experience.
- XMM-Newton data analysis - extensive experience.
- HST data analysis - extensive experience.
- Suzaku XIS data analysis - extensive experience.
- ROSAT data analysis - extensive experience.
- Analysis of X-ray spectral data using xspec.
- Analysis of optical multi-object spectrograph data using IRAF.

Computing experience

- Programming in IDL, C/C++, Python, tcl, Fortran.
- User of the scientific package Mathematica.
- User of Linux, Unix, Mac OS, Microsoft Windows, Microsoft Office, LaTeX. Advanced scripting in Unix.

Observing (on-site)

- On-site observing at the William Herschel Telescope (WHT), La Palma - optical spectroscopy using ISIS.

REFERENCE

Andy Fabian	IoA, Cambridge	acf@ast.cam.ac.uk
Maxim Markevitch	NASA/GSFC	maxim.markevitch@nasa.gov
Jeremy Sanders	MPE, Germany	jsanders@mpe.mpg.de
Daniel Wang	University of Massachusetts	wqd@astro.umass.edu
Mark Bautz	MIT Kavli Institute	mwb@space.mit.edu