STEPHEN ALEXANDER WALKER

Curriculum Vitae

University of Alabama in Huntsville
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Huntsville, AL, 35899

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Employment

University of Alabama, Huntsville – Associate Professor, Department of Physics and Astronomy
August 2025 - present

University of Alabama, Huntsville – Assistant Professor, Department of Physics and Astronomy
August 2019 - August 2025

NASA Goddard Space Flight Center – NASA Postdoctoral Program Fellow.
October 2016 - July 2019

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*

Accepted telescope observation and grant proposals

Summary: As PI: *>4.4 Megaseconds in observing time and >$2,170,000 in funding*

NASA ADAP (Astrophysics Data Analysis Program) as PI

- (2023), *$399,000 in funding*, A systematic study of the outskirts of galaxy clusters with Suzaku archival data **PI: S. A. Walker**

Chandra as PI

- AO25 (2023), 175ks, A detailed view of the rare large scale sloshing cold front in the outskirts of Abell 85 **PI: S. A. Walker** *($58,320 funding)*
- AO25 (2023), 55ks, Searching for the WHIM in the region connecting Abell 3528s and Abell 3532 **PI: S. A. Walker** *($45,978 funding)*
- AO25 (2023), 175ks, A high resolution view of a nearby group as it falls into the

core of the Shapley supercluster **Funding-PI: S. A. Walker** *($64,798 funding)*
• AO24 (2022), 175ks, A detailed view of the rare and colossal 800kpc sloshing cold front in the outskirts of Abell 399. **PI: S. A. Walker** *($83,839 funding)*
• AO24 (2022), 170ks, Abell 2384: can AGN jets break the magnetic draping around a stripped tail? **PI: S. A. Walker** *($82,950 funding)*
• AO24 (2022), 170ks, A Detailed View of a Massive Group as it Merges with Abell 2029. **Funding-PI: S. A. Walker** *($75,410 funding)*
• AO24 (2022), 55ks, Searching for the WHIM in the region connecting Abell 2029 and Abell 2033. **Funding-PI: S. A. Walker** *($51,520 funding)*
• AO23 (2021), 170ks, A complete hi-res view of the rare and enormous 800kpc radius cold front in RXJ2014.8-2430 **PI: S. A. Walker** *($77,370 funding)*
• AO22 (2020), 220ks, Deep Chandra observations of the strong shock in the merging cluster SPT-CLJ2031-4037 **PI: S. A. Walker** *($80,810 funding)*
• AO22 (2020), 150ks, A high resolution view of the extreme 1Mpc radius cold front in A2142 **PI: S. A. Walker** *($70,210 funding)*
• AO21 (2019), 220ks, A complete view of the colossal 700kpc radius cold front in the Perseus cluster **PI: S. A. Walker** *($99,370 funding)*
• AO21 (2019), 195ks, A detailed view of the group NGC 4839 as it merges with the Coma cluster **PI: S. A. Walker** *($91,120 funding)*
• 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

• AO21 (2021), 170ks, Gas clumping in cluster outskirts under the microscope: the Virgo cluster **PI: S. A. Walker** *($94,491 funding)*
• AO19 (2019), 82ks, A complete view of the sloshing activity in the Perseus cluster. **PI: S. A. Walker** *($78,430 funding)*
• AO18 (2018), 300ks, The clearest view of the outskirts of a galaxy cluster: the Coma cluster. **PI: S. A. Walker** *($108,367 funding)*
• 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

• AO10 (2015), 240ks, Complete coverage of the virial radius of the Perseus cluster. **Science-PI: S. A. Walker (with Chris Reynolds)**

• AO10 (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)*

NuStar as PI

• AO9 (2023), 230ks, PROBING THE NATURE OF THE HARD X-RAY EXCESS IN THE MERGING CLUSTER ABELL 3667 **PI: S. A. Walker** *($69,272 funding)*

• AO6 (2020), 230ks, NuStar observations of the strong shock in the cluster SPT-CLJ2031-4037 **PI: S. A. Walker** *($73,375 funding)*

Chandra as Co-I

• AO22 (2020), Theory proposal: Simulating the Combined Effects of Mergers and AGN Feedback in the Perseus Cluster **PI: J. ZuHone** *($75,100 funding)*

• AO21 (2019), 45ks, A Search for a Pre-Merger Shock in the Abell 399-Abell 401 Intercluster Filament **PI: G. Alvarez**

• 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

• AO22 (2022), 784ks, Measuring velocity structures in the Abell 3266 cluster **PI: E. Gatuzz**

• AO20 (2020), 900ks, Measuring merging, feedback and sloshing velocities in the Ophiuchus cluster **PI: E. Gatuzz**

• AO18 (2018), 900ks, Mapping merger, sloshing and AGN-produced bulk motions

in the Centaurus cluster **PI: J.S. Sanders**
• AO17 (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**

ALMA as Co-I

• Cycle 7 (2019), 84.9 hours, A Search for Shocks in the Rare Massive Merging Cluster SPT-CLJ2031-4037 **PI: T. Mroczkowski**

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**

James Webb Space Telescope as Co-I

• 2024, 6 hours, Mapping a Black Hole Accretion Flow with JWST/NIRSpec **PI: J. Hlavacek-Larrondo**

XRISM as Co-I

• 2024, 100ks, ICM VELOCITY STRUCTURE UNVEILED: THE COMA CLUSTER MERGING NATURE. **PI: E. Gatuzz**

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 or PI:

• Dr. Stephen Walker Explores the Longest-Known Galaxy Group Tail
-UAH press release, July 2023
• Galaxies Go on Deep Dive, Leave Fiery Tail Behind
-NASA Chandra press release, June 2023
• 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:

- First sighting of hot gas sloshing in galaxy cluster

-ESA press release, January 2020 - Sanders et al. 2020

- 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

Selected awards and honors

- NASA Postdoctoral Program Fellowship (2016-2018) - $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.

Teaching experience

Postdocs supervised

- Mohammad Mirakhor (2019-present), UAH
- James Runge (2020-2022), UAH

Graduate research students supervised

- Purva Diwanji, (Aug 2019 - May 2024), PhD student, UAH, graduated May 2024
- Leo Moraczewski (Nov 2020 - present), PhD student, UAH
- Dipika Chandra (August 2021 - present), PhD student, UAH
- Sierra Hauck (August 2022 - present), PhD student, UAH
- Matthew Sundquist (August 2022 - present), PhD student, UAH

Undergraduate research students supervised

- Makayla Frisse (2024), undergraduate student, PH499, UAH
- Justin Bradley (2023), undergraduate student, PH499, UAH
- Nick Erickson (2023), undergraduate student, PH499, UAH
- Jack Wagner (2023), undergraduate student, PH499, UAH
- Isabelle Wingate (2023), undergraduate student, PH499, UAH
- Sean Heflin (2022), undergraduate student, PH499, UAH

- Nichelle Grabowski (2022), undergraduate student, PH499, UAH
- Jack Phillips (2022), undergraduate Honors student, PH499, UAH
- Cody Roberts (2022), undergraduate student, PH499, UAH
- Massimo Martin (2022), undergraduate student, PH499, UAH
- Mary Beth Robertson (2022), undergraduate student, PH499, UAH
- Tamia Hampton (2021), undergraduate student, PH499, UAH
- Sierra Hauck (2021), undergraduate Honors student, PH499, UAH
- Dawson Loveless (2021), undergraduate Honors student, PH499, UAH
- Emily Coke (2021), undergraduate student, PH499, UAH
- Paul Alley (2021), undergraduate student, PH499, UAH
- Jessie Wallace (2020), undergraduate student, PH499, UAH
- Sierra Wolbert (2020), undergraduate student, PH499, UAH
- Autumn Shackelford (2020), undergraduate student, PH499, UAH
- Guy Lee (2020), undergraduate student, PH499, UAH
- Austin Haufler (2019), undergraduate student, PH499, UAH
- 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.

Courses taught

- Teaches AST 471/571 - Astrophysics, UAHuntsville, Fall 2019-present
- Teaches PH 499 - Physics Practicum (capstone course), UAHuntsville, Fall 2019 -present
- Teaches AST 107 - Exploring the Cosmos II, UAHuntsville, Spring 2020-2022
- Teaches AST 371 - Intro to Astrophysics, UAHuntsville, Spring 2022, 2024
- Teaches PH 251 - Special Relativity, UAHuntsville, Spring 2023-present
- Taught PH 789 - Galaxy Clusters, UAHuntsville, Summer 2021
- Tutor for third-year undergraduate Physical Cosmology course, 2011 University of Cambridge.

Peer review

- Referee for Nature, 2017-present
- Referee for Nature Astronomy, 2018-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
- NuStar Proposal Peer Review

- Reviewer for the NASA Earth and Space Science Fellowship
- NSF Proposal Peer Review

Outreach

Nov 2021 - Television news interview for WHNT19 news channel as part of their 'Leadership Perspectives' section
Oct 2021 - Interviewed live on the WHNT19 news channel to talk about the discovery of an exoplanet outside of our Milky Way
Oct 2021 - Assisted with UAH College of Science Discovery Days
Nov 2020 - Made this video for the UAH College of Science Discovery Day
Nov 2020 - Collaborated in virtual exhibit for my research in worldwide virtual Supercomputing Conference (SC20).
Nov 2019 - Assisted with UAH College of Science Discovery Day
Jan 2019 - Invited talk at Astronomy on Tap, Washington DC - Cosmic X-ray Tsunamis
Apr 2018 - Guest blog for NASA's 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 - designed and maintained website for the society
2008-2010 - Committee member for Oxford University Physics Society - designed and maintained website for the society

Talks and seminars

Invited talks

June 2023 - *'X-ray Observations of a Group of Galaxies Falling into the Coma Cluster'*, AAS242.
Video link is here
Nov 2022 - *'Probing black hole feedback and cosmic collisions in galaxy clusters'*, Von Braun Astronomical Society seminar.
Video link is here
Jul 2022 - *'Connections to the cosmic web with AXIS'*, Advanced X-ray Imaging Satellite seminar series.
Video link is here
Sep 2020 - *'Galaxy cluster outskirts: Pushing back the final frontier in cluster astrophysics'*, University of Alabama in Tuscaloosa physics seminar.

Video link is here

Jun 2019 - *'Unraveling the physics of the ICM with cold fronts'*
XMM-Newton Workshop - Astrophysics of Hot Plasmas, ESAC, Madrid

Jan 2019 - *'Galaxy cluster outskirts: Pushing back the final frontier in cluster astrophysics'*, UAHuntsville Physics seminar

Nov 2018 - *'Unraveling the physics of the ICM with cold fronts'*
High Energy Phenomena seminar, CfA Harvard

Nov 2018 - *'The physics of galaxy cluster outskirts'*
Galaxies and Cosmology seminar, CfA Harvard
Video link is here (second speaker in video).

Nov 2018 - *'Galaxy clusters: Unraveling Astrophysics in Cosmic Laboratories'*
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, Univerity 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

June 2021 - *'Probing Within The Bondi Radius Of The Ultramassive Black Hole In NGC 1600'* AAS238 meeting

Dec 2019 - *'Unraveling the physics of the ICM with cold fronts'*
20 Years of Chandra Science Symposium, Boston

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