

Bradford Snios

Astrophysical Researcher

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I am a physicist with experience in theoretical and computational research, who possesses an extensive knowledge of image analysis and spectroscopic modeling based on first-principle physics. I have academic and industry expertise in both image processing and algorithm development, particularly for satellite-based observations. I also possess excellent communication skills, as demonstrated by my publications to high-ranking academic journals, accepted proposals, and invited talks.

Education

University of Connecticut

Ph.D. Physics

Storrs, CT

2010–2016

- GPA: 3.9/4.0
- **Thesis:** *Spectral Analysis of X-Ray Emission Mechanisms in Local Astrophysical Environments*
- Researched spectroscopic modeling and signal processing of high-energy emissions from Solar System objects, such as comets and planets
- Created first-principle spectrum models of UV/X-rays for use in astronomical observations

Rochester Institute of Technology (RIT)

B.S. Physics

Rochester, NY

2005–2009

- GPA: 3.6/4.0, graduated with High Honors
- Minors in Astronomy and Philosophy
- Researched pattern recognition in image processing, with a focus on astrophysical databases
- Completed elective coursework focused on observational astronomy, including image analysis and design/fabrication of CCD and CMOS detectors

Work Experience

Redwire Space

Systems Engineer Supervisor, Algorithm & Simulation

Marlborough, MA

2024–

- Team lead for system engineer division; subject matter expert for star tracker & satellite imagery
- Led development of space-flight navigation algorithm from Technical Readiness Level (TRL) 3 to TRL 9, as demonstrated from several flights and lunar landings
- Oversaw algorithm development and data analysis for both star tracker and camera systems

Systems Engineer, Modeling & Simulation

2022–2024

- Researched and developed software for satellite navigational sensors, including star trackers and sun sensors
- Generated high-precision simulations of image responses, with an emphasis on instrument systematics and optics aberration
- Developed centroiding and source detection algorithms for use in real-time environments

Center for Astrophysics | Harvard & Smithsonian

Postdoctoral Researcher

Cambridge, MA

2019–2022

- Analyzed morphological and spectroscopic properties of astrophysical objects using satellite-based X-ray observations
- Developed high-precision astrometric alignment techniques of satellite observations
- Modeled point-spread function of satellite optics to quantify subpixel morphology of sources

Postdoctoral Researcher

2016–2019

- Developed first-principle physical models of astrophysical emission spectra in C++/Python
- Characterized subpixel precision of remote imagers, which led to first-ever detection of motion in an extragalactic X-ray source
- Utilized numerical simulations to verify the presence of nano-scale dust/ice particles in X-ray emission spectra from Solar System objects

Teaching Experience

(Sample syllabus available upon request)

University of Connecticut

Storrs, CT

Course Instructor

2014

- Taught one section of Physics for Engineers (PHYS 1501), a calculus-based mechanics course which consisted of 140+ students
- Utilized flipped classroom platform with an emphasis on group discussion/work in the classroom
- Received 4.6/5.0 teacher rating from the student evaluations

University of Connecticut

Storrs, CT

Course Instructor

2013–2014

- Taught two sections of Introduction to Astronomy (PHYS 1025) for non-majors
- Classes consisted of 10–20 students per section
- Personally developed entire course curriculum, including all teaching materials, labs, and lectures

University of Connecticut

Storrs, CT

Teaching Assistant

2010–2016

- Teaching assistant for 28 different sections of intro sequence physics/astronomy courses
- Updated lab manuals for courses, which reduced student confusion and motivated group discussion
- Guest lectured for advanced undergraduate and graduate courses

Mentoring Experience

Thesis Committee Member for Physics PhD student | University of Maryland, Baltimore County | 2022

Academic Advisor in SAO REU Summer Program | CfA Harvard & Smithsonian | 2021

Mentor to Visiting PhD Student on Quasar Studies | CfA Harvard & Smithsonian | 2020–2021

Academic Co-Advisor in SAO REU Summer Program | CfA Harvard & Smithsonian | 2018

Mentor for Undergraduate Thesis Research | University of Connecticut | 2015–2017

Peer-Reviewed Publications

- **Snios, B.**, Schwartz, D. A., Siemiginowska, A., et al. 2022, "X-ray Jets in the High-Redshift Quasars J1405+0415 and J1610+1811," *The Astrophysical Journal*, 934, 107.
- Bariuan, L. G. C., **Snios, B.**, Sobolweska, M., et al. 2022, "The Fundamental Planes of Black Hole Activity for Radio-Loud and Radio-Quiet Quasars," *Monthly Notices of the Royal Astronomical Society*, 513, 4673.
- **Snios, B.**, de Vries, M. N., Nulsen, P. E. J., et al. 2021, "Late-Time X-ray Observations of the Transient Source Cygnus A-2," *Monthly Notices of the Royal Astronomical Society*, 511, 5817.
- **Snios, B.**, Schwartz, D. A., Siemiginowska, A., et al. 2021, "Discovery of Candidate X-ray Jets in High-Redshift Quasars," *The Astrophysical Journal*, 914, 130.
- Dunn, W. R., (4 co-authors), **Snios, B.**, et al. 2021, "A Low Signal Detection of X-Rays From Uranus," *JGR Space Physics*, 126, 6.
- Schwartz, D. A., Siemiginowska, A., **Snios, B.**, et al. 2020, "Two Candidate High-Redshift X-ray Jets Without Coincident Radio Jets" *The Astrophysical Journal*, 904, 57.

- **Snios, B.**, Siemiginowska, A., Sobolewska, M., et al. 2020, "X-ray Properties of Young Radio Quasars at $z > 4.5$," *The Astrophysical Journal*, 899, 127.
- Hu, B. X., (3 co-authors), **Snios, B.**, et al. 2020, "Spikey: self-lensing flares from eccentric SMBH binaries," *Monthly Notices of the Royal Astronomical Society*, 495, 4.
- Dunn, W. R., (17 co-authors), **Snios, B.**, et al. 2020, "Jupiter's X-ray Emission During the 2007 Solar Minimum," *JGR Space Physics*, 125, 6.
- **Snios, B.**, Johnson, A. C., Nulsen, P. E. J., et al. 2020, "The X-Ray Cavity Around Hotspot E in Cygnus A: Tunneled by a Deflected Jet," *The Astrophysical Journal*, 891, 2.
- **Snios, B.**, Nulsen, P. E. J., Kraft, R. P., et al. 2019, "Detection of Superluminal Motion in the X-ray Jet of M87," *The Astrophysical Journal*, 879, 8.
- **Snios, B.**, Dunn, W. R., Lisse, C. M., et al. 2019, "X-rays Studies of the Solar System," *Astro2020 Decadal Survey, Bulletin of the American Astronomical Society*, 51, 3.
- **Snios, B.**, Wykes, S., Nulsen, P. E. J., et al. 2019, "Variability and Proper Motion of X-ray Knots in the Jet of Centaurus A," *The Astrophysical Journal*, 871, 248.
- Wykes, S., **Snios, B.**, Nulsen, P. E. J., et al. 2019, "A 1D Fluid Model of the Centaurus A Jet," *Monthly Notices of the Royal Astronomical Society*, 485, 872.
- de Vries, M. N., (3 co-authors), **Snios, B.**, et al. 2018, "Detection of Non-thermal X-ray Emission in the Jets and Lobes of Cygnus A," *Monthly Notices of the Royal Astronomical Society*, 478, 4010.
- Duffy, R., (5 co-authors), **Snios, B.**, et al. 2018, "The X-ray Ribs Within the Cocoon Shock of Cygnus A," *Monthly Notices of the Royal Astronomical Society*, 476, 4848.
- **Snios, B.**, Nulsen, P. E. J., Wise, M. W., et al. 2018, "The Cocoon Shocks of Cygnus A: Pressures and Their Implications for the Jets and Lobes," *The Astrophysical Journal*, 855, 71.
- **Snios, B.**, Lichtman, J., Kharchenko, V., et al. 2018, "The Presence of Dust and Ice Scattering in X-Ray Emissions from Comets," *The Astrophysical Journal*, 852, 138.
- Lisse, C., (13 co-authors), **Snios, B.**, et al. 2016, "The Puzzling Detection of Plutonian X-Rays by *Chandra*," *Icarus*, 287, 103.
- **Snios, B.**, Kharchenko, V., Lisse, C. M., et al. 2016, "*Chandra* Observations of Comets C/2012 S1 (ISON) and C/2011 L4 (PanSTARRS)," *The Astrophysical Journal*, 818, 199.
- **Snios, B.**, Lewkow, N., & Kharchenko, V., 2014, "Cometary Emissions Induced by Scattering and Fluorescence of Solar X-Rays," *Astronomy & Astrophysics*, 568, A80.
- O'Dea, K. P., (3 co-authors), **Snios, B.**, et al. 2010, "HST FUV Observations of Brightest Cluster Galaxies: The Role of Star Formation in Cooling Flows and BCG Evolution," *The Astrophysical Journal*, 719, 1619.

Projects & Grants

Principal Investigator

- **Chandra Grant #23700375** | 2021 | *Identification of Two X-ray Jets in High-Redshift Quasars*
- **XMM-Newton Grant #88172** | 2020 | *A Compton-Thick Quasar at $z > 4.5$*
- **Chandra Grant #22700208** | 2020 | *Superluminal Motion in the Jet of M87*
- **XMM-Newton Grant #86240** | 2019 | *Exotic Quasars at the Highest Redshift*
- **Chandra Director's Discretionary Time #20108691** | 2019 | *Chandra Observations of the Interstellar Comet C/2019 Q4 Borisov*
- **Chandra Grant #21700073** | 2019 | *Chandra Observations of the Transient Radio Source Cygnus A-2*
- **Chandra Grant #20100116** | 2018 | *Chandra Observations of the High-Heliospheric Latitude Comet*

21P/Giacobini-Zinner

Co-Investigator

- **Chandra Grant #23700048** | 2021 | *Uncovering the X-ray Properties of a $z \sim 6.5$ Radio-Powerful Quasar*
 - **Chandra Grant #23700086** | 2021 | *Feedback in the Early Universe: The Power of High-Redshift X-ray Jets*
 - **NICER Grant #3125** | 2021 | *NICER Diagnostics of the Comet-Solar Wind Interaction with Deep Space 1's 19P and Rosetta's 67P*
 - **Chandra Grant #22700389** | 2020 | *X-ray Study of a Young Radio Galaxy at $z > 4.5$*
 - **Chandra Grant #22700006** | 2020 | *Measuring the Power of High-Redshift X-ray Jets Without Radio Counterparts*
 - **Chandra Grant #22100373** | 2020 | *Chandra EUV Capabilities: A New View of Jupiter*
 - **NICER Grant #3125** | 2020 | *X-ray Observations During The Predicted Self-Lensing Flare of a Peculiar AGN*
 - **Chandra Grant #21700159** | 2019 | *The First X-ray Observations of a Peculiar Flaring AGN*
 - **Swift Grant #1518206** | 2019 | *The First X-ray Observations of a Peculiar Flaring AGN Observed by Kepler: A Supermassive Black Hole Binary Hypothesis*
 - **Chandra Grant #20700239** | 2018 | *Tidal Disruption Events Unveiled: Directly Probing the Accretion Disks Through Late-Time Chandra Observations*
 - **Chandra Grant #20400376** | 2018 | *Periodic Self-Lensing From Accreting Supermassive Black Hole Binaries*
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Select Presentations & Academic Conferences

- **Chandra Data Science** | Online | Talk | 2021
 - **University of Bologna Seminar Series** | Online | Talk | 2021
 - **CfA High-Energy Seminar Series** | Online | Talk | 2021
 - **Michigan State University Astronomy Seminar** | Online | Talk | 2021
 - **237rd AAS Meeting** | Online | Press Conference | 2021
 - **Astro Chats with YouthAstroNet** | Online | Talk | 2020
 - **20 Years of Chandra Science Symposium** | Boston, MA | Talk | 2019
 - **NERQUAM 29** | Boston, MA | Talk | 2019
 - **233rd AAS Meeting** | Seattle, WA | Talk | 2019
 - **X-ray Skies with High-Res Eyes** | Washington, DC | Talk | 2018
 - **COSPAR 2018** | Pasadena, CA | Talk | 2018
 - **NERQUAM 28** | New Haven, CT | Talk | 2018
 - **Special AAS HEAD Meeting** | Rosemont, IL | Poster | 2018
 - **CfA Quasar Tea 2018** | Cambridge, MA | Talk | 2018
 - **16th AAS HEAD Meeting** | Sun Valley, ID | Poster | 2017
 - **From Chandra To Lynx** | Boston, MA | Talk | 2017
 - **CfA High-Energy Seminar Series** | Cambridge, MA | Talk | 2017
 - **Harvard Postdoc Symposium** | Cambridge, MA | Talk | 2016
 - **CfA Stars and Planets Seminar** | Cambridge, MA | Talk | 2016
 - **Charge-Exchange Symposium** | Cambridge, MA | Poster/Talk | 2015
 - **AGU Fall Meeting** | San Francisco, CA | Poster | 2015
 - **AGU Fall Meeting** | San Francisco, CA | Poster | 2014
 - **UConn Physics Research Symposium** | Storrs, CT | Poster | 2014
 - **UConn Physics Research Symposium** | Storrs, CT | Poster | 2013
 - **RIT Undergraduate Research Symposium** | Rochester, NY | Poster | 2008
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Media Coverage of Research

SciTechDaily | "Puzzling Astrophysics of Quasars in the Early Universe" | [Link](#)
Harvard-Smithsonian CfA Science Highlight | "Quasars in the Early Universe" | [Link](#)
Space.com | "Jets Blast Out of Famous Black Hole at 99% the Speed of Light" | [Link](#)
Science Alert | "Astronomers Witness Supermassive Black Hole Firing Out Jets at 99% The Speed of Light" | [Link](#)
Universe Today | "M87's Black Hole is Firing Out Jets that Travel 99% the Speed of Light" | [Link](#)
Inquisitr | "A Supermassive Black Hole Is Firing Out Jets At 99 Percent The Speed of Light" | [Link](#)
The Daily Galaxy | "Extreme!-Iconic M87 Black Hole Jet Blasts at Close to Speed of Light" | [Link](#)
Chandra X-ray Center | "Famous Black Hole Has Jet Pushing Cosmic Speed Limit" | [Link](#)
Astronomy Magazine | "This Supermassive Black Hole Sends Jets Ricocheting Through its Galaxy" | [Link](#)
Discover Magazine | "Astronomers Spot a Supermassive Black Hole Bouncing Jets Across its Galaxy" | [Link](#)
Phys.Org | "Cygnus A: Ricocheting black hole jet discovered by Chandra" | [Link](#)
SciTechDaily | "Chandra Views Never Before Seen Behavior From Giant Black Hole" | [Link](#)
Chandra X-ray Center | "Ricocheting Black Hole Jet Discovered by Chandra" | [Link](#)
Chandra X-ray Center | "Comets ISON & PanSTARRS: Comets in the X-Treme" | [Link](#)

Professional Memberships & Service

NSF Astronomy and Astrophysics Research Grants Review Panel Participant | 2021
APS-Inclusion, Diversity, and Equity Alliance (APS-IDEA) Member | 2020–2022
NICER Time Allocation Committee Participant | 2020
Athena X-ray Observatory Science Working Group Member | 2020–2022
Advanced X-ray Imaging Satellite (AXIS) Science Working Group Member | 2018–2022
Referee for 'Monthly Notices of the Royal Astronomical Society' | 2020
Referee for 'The Astrophysical Journal' | 2018–2020
Chandra Time Allocation Committee Facilitator | 2017
American Astronomical Society (AAS) Member | 2016–
American Geophysical Union (AGU) Member | 2012–
Sigma Pi Sigma ($\Sigma\Pi\Sigma$) Member | 2009–

Awards

Outstanding Teaching Assistant Award Recipient | University of Connecticut | 2013
President's Scholarship Recipient | Rochester Institute of Technology | 2005–2009

Computational Skills

Hardware: A/V Setup, Hardware Assembly & Troubleshooting
Language: C, C++, HTML, JavaScript, \LaTeX , Python
OS: MacOS (10.5+), Windows (XP, 7, 8, 10), Linux (CentOS, Fedora, Redhat, Mint, Ubuntu)
Software: Astropy, AutoCAD, Git, G-Suite, IDL, LabVIEW, Mathematica, MATLAB, Microsoft Office

References

Available upon request