Lauren Elicker

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Education

University of Pittsburgh — Fall 2024 – present
Physics Ph.D., Astrophysics Track

University of Cincinnati – Cincinnati, Ohio — Graduated April 2023
Astrophysics B.S., Physics B.S., Minor in Mathematical Science — GPA 3.924/4
University Honors Program

Research Experience

Post-Baccalaureate Researcher – Los Alamos National Laboratory — Aug 2023 – Aug 2024
(Advised by Dr. Greg Salvesen)

- DOE SULI intern for 8 months
- Investigated a scattering time delay contribution to X-ray reverberation lags in black hole X-ray binaries (BHXRBs)
- Used HEASoft and Xspec analysis software and Python to create BHXRB light curves, averaged power spectra, time lag spectra, coherence spectra, and a hardness intensity diagram
- Contributed to a Python pipeline that will be used with future simulations of BHXRBs to create a model that can be used with Xspec
- Presented a poster on this work at the 39th Annual New Mexico Symposium (regional astronomy conference)

DAWN-IRES Scholar – Cosmic Dawn Center (Advised by Dr. Kasper Heintz) — June 2022 – Aug 2022

- Studied HI gas, ionized carbon ([CII]) emission, and Lyman-Alpha emission from high redshift galaxies (z~6-8), focusing on the relationship between HI gas content and Lyman-Alpha velocity offset and how that impacts Reionization
- Modeled the relationship between HI gas mass and Lyman-Alpha velocity offset in Epoch of Reionization galaxies
- Modeled [CII] emission and Lyman Alpha spectra
- Constructed a catalog of galaxies of redshifts 4-8 that have Lyman-Alpha and [CII] emission
- Published a guest Astrobites article on this research (link to my article)
- Presented a poster on this work at the 241st American Astronomical Society meeting
- Preparing a first-author paper on this work

Research Associate – University of Cincinnati (Advised by Dr. Matthew Bayliss) — May 2021 – Aug 2023
JWST ERS NIRSpec Analysis Pipeline Guide — May 2023 – Aug 2023

- Part of the TEMPLATES ERS collaboration
- Mentored a group of 4 undergrads through the process of installing the JWST pipeline developed by STScI and running the NIRSpec IFS reduction pipeline developed by the TEMPLATES collaboration
- Created a step-by-step guide documenting the NIRSpec IFS data reduction process that can be digestible by researchers at any level, making JWST data reduction accessible to novice researchers
- Co-authored a guest Astrobite on this research (link to my article)
- Used QFitsView to create spectra of 4 strong lensing galaxies that were observed by NIRSpec

X-ray AGN Analysis in Strong Lensing Galaxy Clusters May 2021 – Aug 2023

- Completed data reduction of Chandra X-ray images of 32 strong lensing galaxy clusters using Python and CIAO and identified their X-ray point sources and active galactic nuclei (AGN)
- Spatially compared the X-ray AGN to the brightest cluster galaxies observed using Hubble Space Telescope at infrared wavelengths
- Calculated an AGN-hosting BCG fraction for our strong lensing selected galaxy cluster sample to compare to that of a mass-selected cluster sample
- Compiled a catalog of the coordinates, redshifts, and photometry measurements of the X-ray point sources detected in each cluster image
- Presented a poster at the 240th American Astronomical Society meeting
- Preparing a first-author paper on this work

Conquer Chiari Research Center (CCRC) – University of Akron Summer 2017

- Worked with engineering and psychology faculty and graduate students on this multidisciplinary research effort to apply the latest techniques to improve diagnoses and treatment options for patients with Chiari malformation, a neurological disorder
- Used a MATLAB program to analyze cerebrospinal MRI images

Presentations

"X-ray Spectral-Timing Pipeline to Investigate an Electron-Scattering Time Delay in Black Hole Accretion Disks", *39th Annual New Mexico Symposium.* Socorro, NM, November 2023. **L. Elicker**, G. Salvesen

"Effects of Neutral Hydrogen Gas Content on Lyman-Alpha in High Redshift Galaxies", *241st Meeting of the American Astronomical Society.* Seattle, WA, January 2023, id. 413.08. **L. Elicker**, K. Heintz, P. Laursen.

"The Chandra Strong Lens Sample: Radial Density of AGN in Strong Lensing Selected Galaxy Clusters", *240th Meeting of the American Astronomical Society*. Pasadena, CA, June 2022, id. 139.02. **L. Elicker**, M. B. Bayliss, H. Dahle, M. Gladders, G. Mahler, K. Whitaker.

"The Chandra Strong Lens Sample", *240th Meeting of the American Astronomical Society*. Pasadena, CA, June 2022, id. 214.04. M. B. Bayliss, **L. Elicker**, M. McDonald, R. Gassis, K. Sharon, M. D. Gladders, H. Dahle, M. Florian, J. Rigby.

"The Comparison of Light and Matter Distribution: Using Strong Lensing Galaxies to Examine Dark Matter Structure", *240th Meeting of the American Astronomical Society*. Pasadena, CA, June 2022, id. 139.15. R. Gassis, M. B, Bayliss, K. Sharon, H. Dahle, **L. Elicker**, M. Florian, K. Whitaker.

"Radial Density of Supermassive Black Holes in Strong Lensing Selected Galaxy Clusters", *Undergraduate Scholarly Showcase*. University of Cincinnati, Cincinnati, Ohio, April 2022. **L. Elicker,** M. B. Bayliss, M. McDonald, K. Whitaker, K. Sharon, H. Dahle, M. D. Gladders, G. Mahler.

Talks

"X-Ray Spectral-Timing Pipeline to Investigate an Electron-Scattering Time Delay in Black Hole Accretion Disks". Los Alamos National Laboratory, Los Alamos, NM, Nov 2023.

"The Chandra Strong Lens Sample: Active Galactic Nuclei and Brightest Cluster Galaxies in Strong Lensing Selected Galaxy Clusters". University of Cincinnati, Cincinnati, OH, April 2023.

"Effects of HI Gas Content on Lyman-Alpha in High Redshift Galaxies". Cosmic Dawn Center, Niels Bohr Institute, Copenhagen, Denmark, August 2022.

Co-Author Papers

"TEMPLATES: A Robust Outlier Rejection Method for JWST/NIRSpec Integral Field Spectroscopy." PASF, 136, 4. T. A. Hutchison, B. D. Welch, J. R. Rigby, G. M. Olivier, J. E. Birkin, K. A. Phadke, G. Kullar, B. J. Rauscher, K. Sharon, M. Aravena, M. B. Bayliss, **L. A. Elicker**, S. Kim, M. Solimano, J. D. Vieira, D. Vizgan.

"JWST Early Release Science Program TEMPLATES: Targeting Extremely Magnified Panchromatic Lensed Arcs and their Extended Star formation." e-print: arXiv:2312.10465. J. R. Rigby, J. D. Vieira, K. A. Phadke, T. A. Hutchison, B. Welch, J. Cathey, J. S. Spilker, A. H. Gonzalez, P. Adhikari, M. Aravena, M. B. Bayliss, J. E. Birkin, E. Bursk, S. C. Chapman, H. Dahle, **L. A. Elicker**, T. C. Fischer, M. K. Florian, M. D. Gladders, C. C. Hayward, R. Hewald, L. A. Kettler, G. Khullar, S. Kim, D. R. Law, G. Mahler, S. Malhotra, E. J. Murphy, D. Narayanan, G. M. Olivier, J. E. Rhoads, K. Sharon, M. Solimano, A. Thiruvengadam, D. Vizgan, N. Younker.

"Understanding Shape and Centroid Deviations in 39 Strong Lensing Galaxy Clusters in Various Dynamical States." EPJ Web of Conferences, 293, 00021 (2024), appears in Proc. of the mm Universe 2023 conference. R. Gassis, M. B. Bayliss, K. Sharon, G. Mahler, M. D. Gladders, H. Dahle, M. K. Florian, J. R. Rigby, M. McDonald, **L. Elicker**, M. R. Owens.

Grants

Ohio Space Grant Consortium Student-Innovative-Creative-Hands-on Project Grant July 2023

- Co-PI
- Project Title: Bringing JWST to Students: Student-led Development of JWST Data Analysis Tool
- Award of $5000

Awards/Scholarships

Violet M. Diller Endowment – merit-based, given to one outstanding woman in physics per year 2021-2023

Cincinnatus Scholarship – merit-based, requires 30 hours of volunteer service each year 2019-2023

Jacob & Veronica Schmitt Scholarship – merit-based, for student in College of Arts and Sciences 2021-2022

Skills

- Observatories – JWST-NIRSpec, NICER-XTI, Chandra-ACIS
- Analysis – DS9, Xspec, CIAO, Fourier transform, modeling spectra
- Programming – Python, MATLAB
- Project Management – Git

Work Experience

Gallery Sales Associate – Los Alamos Arts Council Jan 2024 – Aus 2024

- Operated the gallery and consignment shop for this nonprofit organization that features the work of local and regional New Mexican artists
- Responsible for opening and closing the gallery
- Facilitated a weekly open art studio for adults

Physics Teaching Assistant – University of Cincinnati Aug 2021 – April 2022

- Teaching Assistant for algebra-based and calculus-based physics courses
- Improved my skill in communicating physics concepts by answering students' questions and working on problems with students in class and during my weekly office hour in the Physics Learning Center
- Graded weekly assignments and proctored exams

Acme Fresh Market – Akron, Ohio May 2021 – January 2022 and August 2018 – January 2020

- Operated the cash register efficiently and accurately to ensure a smooth check out
- Communicated well with customers in a polite and professional manner to resolve disputes efficiently
- Developed quick-thinking and organizational skills by organizing customers' purchases
- Utilized time management to quickly return stock to the correct location in the store

Memberships

Sigma Pi Sigma – physics honor society April 2022 – April 2023
Society of Physics Students August 2021 – April 2023
American Astronomical Society – undergraduate member September 2021 – Jan 2023
Phi Sigma Rho – sorority for women in science fields November 2019 – Apr 2023

Extracurriculars

UC APS-IDEA September 2022 – April 2023

- Weekly meeting of physics students discussing topics of inclusion, diversity, and equity within physics, higher education, and industry

Astrophysics Journal Club May 2021 – April 2023

- Weekly club of astrophysics and philosophy faculty, undergraduate students, graduate students, and post-docs consisting of one discussion on an astrophysics colloquium or paper

Student Researcher Learning Community Summer 2021

- Weekly meetings discussing topics such as research ethics, data, evidence, and presentations

Bearcat Buddies Tutor Fall 2020 – Spring 2021

- Math and reading tutor for Cincinnati Public Schools elementary students

Copley Drumbeat Newspaper Fall 2017 – Spring 2019

- Editor-in-Chief, Sports Editor; InDesign and Photoshop experience

Copley Science Olympiad Fall 2011 – Spring 2019

- Co-captain for two years; science knowledge and skills competitions among middle and high schools