

Saarah Hall

saarah@u.northwestern.edu ★ saarahhall.github.io

Education

Northwestern University

Ph.D. Candidate, Astronomy

Certificate: [Integrated Data Science](#)

Advisor: Adam A. Miller

Evanston, IL

September 2022 - present

University of Pennsylvania

B.A., Physics (with Departmental Honors)

Concentration: Astrophysics

Advisor: Gary Bernstein

Philadelphia, PA

August 2018 - May 2022

Research Experience

Analyzing JWST Observations of Rare Supernovae

June 2025 - present

Northwestern University

Advisors: Dr. Lindsey Kwok and Assistant Professor Adam A. Miller

- Analyzing spectra from the *James Webb Space Telescope (JWST)* taken of two Calcium-strong Transients (CaSTs), a rare subclass of supernovae with unknown origins and explosion physics
- Uncovering the structure and contents of these two CaSTs via modeling of spectral features with *emcee* and *dynesty* (Python libraries used for Bayesian inference)
- Developing modeling software for the spectral features attributed to Carbon Monoxide (CO) and cosmic dust, also utilized by collaborators (Sears+2026b and Macrie+2026 in prep.)

Data Reduction Pipeline for SEDM-KP

November 2022 - present

Northwestern University

Advisor: Assistant Professor Adam A. Miller

- Developing the photometric data reduction pipeline (DRP) for the Spectral Energy Distribution Machine at Kitt Peak (SEDM-KP, formerly SEDMv2)
- Collaborating across institutions to develop an open-source Python package for DRP building; the [Modular Image Reduction and Analysis Resource \(mirar\)](#)
- Regularly monitoring and observing with SEDM-KP, virtually and in-person at Kitt Peak

Scene Modeling Photometry on HPM Stars

August 2021 - August 2022

University of Pennsylvania - Senior Honors Thesis

Advisor: Professor Gary Bernstein

- Optimizing models of images for precise measurements of fluxes and motions of high-proper-motion (HPM) stars discovered in the DES

Optical Counterparts to Gravitational Waves

June 2021 - August 2021

Northwestern University CIERA REU

Advisors: Dr. Kerry Paterson and Professor Wen-Fai Fong

- Upgrading image subtraction software to facilitate the counterpart candidate vetting process by writing and integrating Python code into the team's pipeline

Animating Trans-Neptunian Objects

May 2020 - May 2021

University of Pennsylvania

Advisor: Professor Gary Bernstein

- Developing Python code to transform numerical data from the Dark Energy Survey (DES) into an [animation](#) (see video also at vimeo.com/662683536) of 800+ Trans-Neptunian Object (TNO) orbital patterns over thousands of years

Software	Robert Stein, Viraj Karambelkar, Sulekha Kishore, Saarah Hall , Benjamin Roulston, & Jamie Soon (2024), <i>mirar</i> , DOI: 10.5281/zenodo.21716527 <i>Photometric reduction code, used for WINTER, SEDM-KP, DREAMS, GMOS, WASP, and WIRC</i>
Publications	Saarah Hall, Lindsey A. Kwok, Aravind P. Ravi, and 29 others (2026), <i>JWST Observations of Calcium-Strong Transients: I. Complex Nebular He Emission in SN 2024uj</i>, arXiv:2607.00111 Huei Sears, Jean J. Somalwar, Ryan Chornock, and 22 others, including Saarah Hall (2026), <i>Late-time JWST/NIRCam Observations of the Extremely Long-duration GRB 250702B/EP 250702a and Its Host Galaxy</i>, arXiv:2606.18353 Colin W. Macrie, Conor Larison, Huei Sears, and 42 others, including Saarah Hall (2026), <i>JWST Nebular Spectroscopy of SN 2023qov: Circumstellar Dust Emission in a Normal Type Ia Supernova</i>, arXiv:2604.09777 Adam A. Miller, Natasha S. Abrams, Greg Aldering, and 75 others, including Saarah Hall (2025), <i>The La Silla Schmidt Southern Survey</i>, PASP, 137, 9. 10.1088/1538-3873/ae02c5 Yashvi Sharma, Jesper Sollerman, Shrinivas Kulkarni, and 33 others, including Saarah Hall (2024), <i>Dramatic Rebrightening of the Type-changing Stripped-envelope Supernova SN 2023aew</i>, ApJ, 966, 199. 10.3847/1538-4357/ad3758 Griffin Hosseinzadeh, Kerry Paterson, Jillian C. Rastinejad, and 14 others, including Saarah Hall (2024), <i>SAGUARO: Time-domain Infrastructure for the Fourth Gravitational-wave Observing Run and Beyond</i>, ApJ, 964, 35. 10.3847/1538-4357/ad2170 Chang Liu, Adam A. Miller, Samuel J. Boos, and 28 others, including Saarah Hall (2023), <i>SN 2022joj: A Peculiar Type Ia Supernova Possibly Driven by an Asymmetric Helium-shell Double Detonation</i>, ApJ, 958, 178. 10.3847/1538-4357/acffc9 J. C. Rastinejad, K. Paterson, W. Fong, and 9 others, including S. Hall (2022), <i>A Systematic Exploration of Kilonova Candidates from Neutron Star Mergers During the Third Gravitational Wave Observing Run</i>, ApJ, 927, 50. 10.3847/1538-4357/ac4d34
Posters & Presentations	First JWST observations of Calcium-Strong Transients provide evidence for thermonuclear origin <i>Contributed Talk; June 2026; CIERA Observational Group Meeting</i> <i>Contributed Talk; July 2026; European Astronomical Society Annual Meeting</i> <i>Contributed Talk; July 2026; Extragalactic Transient Universe</i> <i>Contributed Talk; August 2026; Rise Time</i> <i>Contributed Talk; November 2026; Next Decade of SN Science</i> SN 2024uj: molecule formation in a Ca-strong transient <i>Poster Presentation; August 2025; 100 Years of Supernova Science</i> Deriving Time-Dependent Supernova Luminosity Functions via Hierarchical Bayesian Modeling <i>Contributed Talk; January 2025; 245th American Astronomical Society (AAS) Meeting</i> <i>Poster Presentation; August 2024; Rise Time</i> Status Update on SEDMv2's Photometric Data Reduction Pipeline <i>Contributed Talk; October 2023; ZTF 5th Science Meeting</i>

	Data reduction pipeline for SEDMv2 built with mirar <i>Contributed Talk; October 2023; CIERA Observational Group Meeting</i>	
	Photometric Data Reduction Pipeline for the Spectral Energy Distribution Machine Version 2 (SEDMv2) <i>Poster Presentation; June 2023; Transient and Variable Universe Conference at UIUC</i>	
	Searches After Gravitational-waves Using ARizona Observatories (SAGUARO): Updating Optical Counterpart Search Methods <i>iPoster Presentation; June 2022; 240th American Astronomical Society (AAS) Meeting</i> <i>Virtual Poster; August 2021; CIERA REU Poster Session</i> <i>Virtual Presentation; August 2021; Fong Group Meeting</i>	
	The DES Year 6 catalog of trans-Neptunian objects <i>Bernardinelli, P. and Hall, S.</i> <i>Virtual Presentation; May 2021; Dark Energy Survey (DES) Videocon</i>	
	Animating TNOs <i>Virtual Presentation; July 2020; UPenn P&A Undergraduate Summer Research Academy</i>	
Awards & Honors	LSST Discovery Alliance Data Science Fellow	2025 - 2027
	Illinois Space Grant Graduate Fellow, Northwestern	2024 - 2025
	GEM Associate Fellow, Northwestern	2022 - 2024
	Dean's List, UPenn	2021 - 2022
	Hispanic Scholarship Fund	2021
	NSF REU Stipend	2021
	Allied Family Scholarship Fund	2018 - 2021, 2023-2025
	Vagelos Endowed Scholarship in Molecular Life Sciences, UPenn	2018 - 2021
	AAPT Outstanding Physics Student of the Year	2018
Outreach & Leadership	Brinson Mentor, REACH Further Mentor Lead, CIERA REACH Further	2026
	Astronomer Conversations Volunteer, Adler Planetarium	2024 - present
	Coding Tutor, CIERA REACH	2023-present
	Research Mentor, CIERA REACH Further	2023
	STEAM Mentor (Volunteer), Operation Airlift by Adler Planetarium	2023
	Astronomy on Tap (Volunteer)	2022 - present
	Science Olympiad at UPenn (SOUP) Grader (Volunteer)	2022
	Women in Physics Board Member, UPenn	2020 - 2022
	Video Editor, Singh Center for Nanotechnology	2019 - 2022
Teaching Experience	Teaching Assistant, Northwestern Department of Physics & Astronomy	
	• Physics 126-3 - Physics for ISP Lab - Waves and Optics	Spring 2024
	• Physics 126-2 - Physics for ISP Lab - Electricity and Magnetism	Winter 2024
	• Data Science 421 - Integrated Data Analytics I	Fall 2023
	Tutor & Grader, UPenn Physics Department	
	• Astronomy 001 - A Survey of the Universe	2021
	• Astronomy 007 - The Big Bang and Beyond	2021
Workshops & Summer Schools	LS4 Team Meeting, Northwestern University	March 2025
	Astro Imaging Workshop, Northwestern University	July 2023
	ZTF Summer School, Virtual	July 2023

