

Saarah Hall

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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

Northwestern University

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

June 2025 - present

- ★ 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 SEDMv2

Northwestern University

Advisor: Assistant Professor Adam A. Miller

November 2022 - present

- ★ Developing the photometric data reduction pipeline (DRP) for the Spectral Energy Distribution Machine version 2 (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 SEDMv2, virtually and in-person at Kitt Peak

Scene Modeling Photometry on HPM Stars

University of Pennsylvania - Senior Honors Thesis

Advisor: Professor Gary Bernstein

August 2021 - August 2022

- ★ 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

Northwestern University CIERA REU

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

June 2021 - August 2021

- ★ 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

University of Pennsylvania

Advisor: Professor Gary Bernstein

May 2020 - May 2021

- ★ 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, SEDMv2, DREAMS, GMOS, WASP, and WIRC</i>
Publications	Viraj Karambelkar, Robert Stein, Danielle Frostig, Saarah Hall, and 17 others (2026), <i>A data processing pipeline for the WINTER near-infrared surveyor using the mirar framework</i>, arXiv:2609.10675 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; November 2026; Next Decade of SN Science</i> <i>Contributed Talk; August 2026; Rise.Time</i> <i>Contributed Talk; July 2026; Extragalactic Transient Universe</i> <i>Contributed Talk; July 2026; European Astronomical Society Annual Meeting</i> <i>Contributed Talk; June 2026; CIERA Observational Group Meeting</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 Meeting</i> <i>Poster Presentation; August 2024; Rise.Time</i>

Status Update on SEDMv2's Photometric Data Reduction Pipeline

Contributed Talk; October 2023; [ZTF 5th Science Meeting](#)

Data reduction pipeline for SEDMv2 built with mirar

Contributed Talk; October 2023; CIERA Observational Group Meeting

Photometric Data Reduction Pipeline for the Spectral Energy Distribution Machine Version 2 (SEDMv2)

Poster Presentation; June 2023; [Transient and Variable Universe Conference at UIUC](#)

Searches After Gravitational-waves Using ARizona Observatories (SAGUARO): Updating Optical Counterpart Search Methods

[iPoster Presentation](#); June 2022; 240th American Astronomical Society Meeting

Virtual Poster; August 2021; CIERA REU Poster Session

Virtual Presentation; August 2021; Fong Group Meeting

The DES Year 6 catalog of trans-Neptunian objects

Bernardinelli, P. and Hall, S.

Virtual Presentation; May 2021; Dark Energy Survey (DES) Videocon

Animating TNOs

Virtual Presentation; July 2020; UPenn [P&A](#) Undergraduate Summer Research Academy

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
- Physics 126-2 - Physics for ISP Lab - Electricity and Magnetism
- Data Science 421 - Integrated Data Analytics I

Spring 2024

Winter 2024

Fall 2023

Tutor & Grader, UPenn Physics Department

- Astronomy 001 - A Survey of the Universe
- Astronomy 007 - The Big Bang and Beyond

2021

2021

Workshops & Summer Schools

[LS4 Team Meeting](#), Northwestern University

March 2025

Astro Imaging Workshop, *Northwestern University*
ZTF Summer School, *Virtual*
Time Domain Astronomy in the Rubin Era, *Northwestern University*

July 2023
July 2023
October 2022