

Saarah Hall

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Education

Northwestern University

Ph.D. Student, Astronomy

Advisor: Adam A. Miller

Certificate: [Integrated Data Science](#)

Evanston, IL

September 2022 - present

University of Pennsylvania

B.A., Physics (with Honors), cum laude

Concentration: Astrophysics

Advisor: Gary Bernstein

Senior Thesis: Scene Modeling Photometry on High-Proper-Motion Stars

Philadelphia, PA

August 2018 - May 2022

Research Experience

Data Reduction Pipeline for SEDM-KP

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 \(MIRAR\)](#)

November 2022 - present

Scene Modeling Photometry on HPM Stars

University of Pennsylvania

Advisor: Professor Gary Bernstein

- Modeling images as sums of point spread functions (PSFs)
- Optimizing models of images for precise measurements of fluxes and motions of high-proper-motion (HPM) stars discovered in the Dark Energy Survey (DES)

August 2021 - August 2022

Optical Counterparts to Gravitational Waves

Northwestern University CIERA REU

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

- Analyzing and reducing image data from Steward Observatory's Bok Telescope using Python and SAOImage DS9
- Upgrading image subtraction software to facilitate the counterpart candidate vetting process by writing and integrating Python code into the team's pipeline

June 2021 - August 2021

Animating Trans-Neptunian Objects

University of Pennsylvania

Advisor: Professor Gary Bernstein

- Developing Python code to transform numerical data into an animation of any Trans-Neptunian Object (TNO) detected in the Dark Energy Survey (DES)
- Curating a [video](#) which visualizes 800+ TNOs from their first detection to their orbital patterns over thousands of years (see video also at vimeo.com/662683536)

May 2020 - May 2021

Software

Robert Stein, Viraj Karambelkar, Sulekha Kishore, **Saarah Hall**, Benjamin Roulston, & Jamie Soon (2024), *MIRAR*, DOI: [10.5281/zenodo.11043914](https://doi.org/10.5281/zenodo.11043914)

Photometric reduction code, used for WINTER, SEDM-KP, and DREAMS

Awards & Honors	Illinois Space Grant Graduate Fellow , <i>Northwestern</i>	2024 - 2025
	GEM Associate Fellow , <i>Northwestern</i>	2022 - 2024
	Dean's List , <i>UPenn</i>	2021 - 2022
	Hispanic Scholarship Fund	2021
	NSF REU Stipend	2021
	Allied Family Scholarship Fund	2018 - 2021, 2023
	Vagelos Endowed Scholarship in Molecular Life Sciences , <i>UPenn</i>	2018 - 2021
	American Association of Physics Teachers (AAPT) Outstanding Physics Student of the Year	2018
Posters & Presentations	Status Update on SEDMv2's Photometric Data Reduction Pipeline <i>Contributed Talk; October 2023; ZTF 5th Science 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>	
	Gravitational Waves: Streamlining the Optical Counterpart Search <i>Virtual Poster; August 2021; CIERA REU Poster Session</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>	
Publications	Yashvi Sharma, Jesper Sollerman, Shrinivas Kulkarni, and 33 others, including Saarah Hall (2024), <i>Dramatic Rebrightening of the Type-changing Stripped-envelope Supernova SN2023aew</i> , ApJ, 966, 199. 10.3847/1538-4357/ad3758	
	Griffin Hosseinzadeh, Kerry Paterson, and 15 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, and 29 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	
Outreach & Leadership	Astronomer Conversations Volunteer , <i>Adler Planetarium</i>	2024
	Research Mentor , <i>CIERA REACH Further</i>	2023
	STEAM Mentor (Volunteer), <i>Operation Airlift by Adler Planetarium</i>	2023
	Astronomy on Tap (Volunteer)	2022 - present
	Science Olympiad at UPenn (SOUP) Grader (Volunteer)	2022
Women in Physics Board Member , <i>UPenn</i>	2020 - 2022	

	Video Editor , <i>Singh Center for Nanotechnology</i>	2019 - 2022
	K-12 Math Tutor (Volunteer), <i>The Merry Tutor</i>	2017 - 2018
Teaching Experience	Teaching Assistant , <i>Northwestern Department of Physics & Astronomy</i>	
	• 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 , <i>UPenn Physics Department</i>	
	• Astronomy 001 - A Survey of the Universe	2021
	• Astronomy 007 - The Big Bang and Beyond	2021
Workshops & Summer Schools	Astro Imaging Workshop , <i>Northwestern University</i>	July 2023
	ZTF Summer School , <i>Virtual</i>	July 2023
	Time Domain Astronomy in the Rubin Era , ZTF & SEDM-KP Collaboration Meeting, <i>Northwestern University</i>	October 2022
	LSSTC-DSFP (Audit), <i>Northwestern University</i>	September 2022
	P&A Undergraduate Summer Research Academy , <i>UPenn</i>	June - August 2020