

Annastasia L. Haynie

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Education

University of Southern California

August 2018 - Present

- Ph.D., Physics
- USC-Carnegie Observatories Fellow
- Advanced to Candidacy 8/2021
- Teaching Assistant 8/2018-12/2019
- Research Assistant 1/2020-Present

University of South Carolina

August 2014 - May 2018

- Bachelor of Science, Physics
- Minor, Astronomy
- Nina and Frank Avignone Fellow
- Teaching Assistant 8/2017-5/2018
- Student Researcher 8/2015-5/2018

Research Description

I am a USC-Carnegie Observatories Graduate Fellow, and under the advisement of Dr. Anthony Piro, I work on semi-analytic and numerical models of core-collapse supernovae. My focus is on connecting the observable features of the explosions to properties of the progenitor stars that generate them. These provide important tools for helping understand the late stages of massive star evolution.

Publications

A. Haynie & A. L. Piro, “Estimating Ejecta Masses of Stripped Envelope Supernovae Using Late-Time Light Curves,” 2023, in preparation.

A. Haynie & A. L. Piro, “Shock Breakout in Dense Circumstellar Material with Application to PS1-13arp,” 2021, *Ap. J.*, 910, 128.

A. L. Piro, A. Haynie, & Y. Yao, “Shock Cooling Emission from Extended Material Revisited,” 2021, *Ap. J.*, 909, 209.

Awards and Scholarships

Women in Science and Engineering Merit Award May 2022

Awarded to two PhD students in natural sciences each year based on “excellence of the candidate’s research, the trajectory of improvement, and any other personal/professional attributes that demonstrate how the Merit Award may encourage the candidate to pursue a career in science and engineering”. I was nominated for this award by Dr. Stephan Haas, the chair of the USC Physics & Astronomy department.

Conferences and Presentations

Interacting Supernovae – Munich Institute for Astro-, Particle, and BioPhysics February 2023

During this multi-week conference, I presented my work published in *Haynie & Piro (2021)*, regarding shock breakout in dense circumstellar material (CSM) as it applies to the broader field of interacting supernovae and collaborated with other attendees to apply my models to data to characterize the diversity of CSM to understand its origins and how it relates to the final stages of stellar evolution.

SuperVirtual: From Common to Exotic Transients November 2022

For this virtual, international conference I gave a contributed talk on my not yet published work on improvements to a novel method for estimating ejecta masses in stripped-envelope supernovae using late-time light curves. This work proves to be robust against common modeling assumptions, the details of which heavily impact the earlier phases of light curves.

American Astronomical Society 240 June 2022

I presented my work published in *Haynie & Piro (2021)*, regarding shock breakout in dense circumstellar material at the Supernova I session of the summer AAS meeting. I continue to highlight the need for high-cadence, wide-field, ultraviolet surveys to better observe the shock breakout phase of a supernovae and understand what progenitor properties can be derived from these observations.

SuperVirtual: From Common to Exotic Transients November 2021

I gave a contributed talk presenting my work published in *Haynie & Piro (2021)*, highlighting the need for high cadence, wide-field ultraviolet surveys to observe shock breakout events more easily and exploring how interactions with circumstellar material may provide insight into the final stages of stellar evolution.

Reclaiming STEM Science Communication Workshop September 2019 and 2020

I attended these workshops to develop skills in science communication as a way of making scientific research more accessible to all. I participated in breakout sessions to develop plans to address systematic bias in STEM, learn how to engage with policymakers, and improve communication skills with respect to discussing science with the general public.

Carnegie Observatories Summer Research Symposium August 2019

I presented research conducted with Anthony Piro on updates to Supernova Explosion Code (SNEC)-including the introduction of new physics not currently accounted for in the simulation and preliminary results regarding the effects of circumstellar material on the shock breakout signal observed in core-collapse supernovae.

Outreach and Volunteer Experience**Graduate Student Workers Organizing Committee, Bargaining Team April 2023-Present
University of Southern California – GSWOC UAW**

I was democratically elected by my fellow graduate students to be a member of the bargaining team tasked with negotiating our first union contract with USC administration. As a member of the bargaining team, I work with the greater organizing committee to poll graduate students on the issues that they care about and want to see addressed in our contract, and research and write proposals on these topics to present to the administration. I am very passionate about ensuring that USC is a safe and productive environment where graduate students can thrive.

**Graduate Association for Student in Physics, President August 2019 – August 2022
Department of Physics and Astronomy, University of Southern California**

The Graduate Association for Students in Physics (GASP) organizes social and professional development events for students in the physics department, as well as outreach activities on campus. As president, I oversaw our peer mentorship program and worked with faculty to improve the culture and social climate of our department to aid in the recruitment, support, and retention of underrepresented minority students in physics. Since retiring from this position, I have moved on to being a Senior Advisor to the new leadership.

Skype a Scientist Program August 2019 – Present

Skype a Scientist is a nonprofit organization that connects K-12 classrooms with STEM professionals to have informal question and answer discussions about various science topics and the pathways to become a scientist. Several times per month I have sessions with classrooms to answer student questions about space, teach them about the life cycle of a star, and dispel myths about what kinds of people become scientists.

Letters to a Pre-Scientist Program August 2020 – Present

Letters to a Pre-Scientist pairs students in low-income schools with STEM professionals for a year-long pen pal program as part of their science class. The goal of the program is to broaden students' understanding of what scientists do at work and encourage them to explore a future in STEM. During the 2020/2021 school year I was paired with a sixth grader in Chicago who was very inspired by the concept of using computers to solve difficult math problems.

CASSI Peer Mentor Program Summers 2019, 2020, 2021, 2022**Carnegie Observatories**

During each of my summers conducting research at Carnegie Observatories I have served as a peer mentor for undergraduate students participating in the CASSI summer program through Carnegie. As part of this program, I serve as a resource outside of the students' main advisors to develop research-related skills such as, but not limited to, coding, scientific writing, and preparing a talk, as well as applying to graduate school.