

# ZOE HACKSHAW

The University of Texas at Austin ◊ Department of Astronomy

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<https://zoehackshaw.github.io/>

## EDUCATION

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**University of Texas at Austin**

2022-Present

PhD in Astronomy expected June 2027

**University of Florida**

2017-2021

Bachelor of Science in Astrophysics, *summa cum laude*

## RESEARCH

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**Graduate Research Assistant**

August 2022 - Present

**Advisor:** Prof. Keith Hawkins

*University of Texas at Austin*

- Used chemical cartography to map azimuthal variations in elemental gradients of stars in the Galactic disk, as well as investigated the stellar age-dependence on the azimuthal sub-structure.
- To study the origin history and formation pathways of Massive Alpha Enhanced stars, I analyzed the  $^{12}\text{C}/^{13}\text{C}$  ratios of these stars as well as used diagnostics to investigate possible binarity.

**Undergraduate Research Assistant**

December 2019 - August 2022

**Advisor:** Prof. Rana Ezzeddine

*University of Florida*

## PUBLICATIONS

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- **Hackshaw Z.**, Hawkins K., Filion C., Horta D., Laporte C. F. P., Carr C., Price-Whelan A. M et al 2024 **ApJ**, DOI 10.3847/1538-4357/ad900e  
“*[X/Fe] Marks the Spot: Mapping Chemical Azimuthal Variations in the Galactic Disk with APOGEE*”
- Kowkabany J., **Hackshaw Z.**, Ezzeddine R. et al 2022, **ApJ**, DOI 10.48550/arXiv.2209.02184  
“*2MASS J05241392–0336543: A Detailed Abundance Analysis of the Most Lithium Enhanced Giant*”
- Shah S., Ezzeddine R., **Hackshaw Z.**, Ji A., Hansen T., Catelan M., Holmbeck E., Beers T. et al 2023, **ApJ**, DOI 10.3847/1538-4357/acb8af  
“*Uranium Abundances and Ages of r-process Enhanced Stars with Novel U II Lines*”

## AWARDS AND SCHOLARSHIPS

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• **David L. Lambert Graduate Fellowship**

2024

*University of Texas at Austin*

• **Senior Thesis Highest Honors, *summa cum laude***

May 2021

*University of Florida Department of Astronomy*

• **FL Academic Scholar’s Award**

2017-2021

*University of Florida*

## OBSERVING EXPERIENCE

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### McDonald Observatory

August 2024; October 2024

*PI: Zoe Hackshaw, 7 nights*

Spectroscopically observed FGK companions of polluted White Dwarfs on the Tull Coudé spectrograph on the 2.7 m telescope to characterize the planetary interiors that have been accreted onto the White dwarfs.

### McDonald Observatory

June 2024

*PI: Zoe Hackshaw, 7 nights*

Used the Tull Coudé spectrograph on the 2.7 m Harlan J Smith Telescope to get over 45 hours of data on Gaia DR3 4318465066420528000, the companion of Gaia BH3 to get neutron capture abundances and place a nuclear cosmo-chronometric age on this system.

### McDonald Observatory

February 2024

*PI: Zoe Hackshaw, 7 nights*

Spectroscopically observed 9 metal-poor stars with asteroseismic ages using the 2.7 m Tull Coudé spectrograph to place nuclear cosmo-chronometric ages on these sources. I additionally observed 6 metal-poor candidates from SDSS-V.

## TEACHING AND MENTORSHIP

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### Research Mentor

Spring 2024 - Present

*Abigail Skelton and Nachiket Yadav*

Guided two undergraduate students in using the HETDEX and HETVIPS catalogs to obtain stellar parameters and elemental abundances of these stars using data-driven techniques.

### Teaching Assistant

Spring 2023

*AST 352K: Stellar Astronomy; University of Texas at Austin*

Assisted Prof. Keith Hawkins with teaching, grading, as well as giving a guest lecture for AST 352K covering theoretical and observational stellar astronomy. I hosted weekly office hours to help students with the coursework.

## CONFERENCE PRESENTATIONS

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### Milky Way Assembly Tale

June 2024

*Istituto Nazionale Di Astrofisica*

Presented a poster on my work using APOGEE DR-17 to uncover chemical azimuthal variations in the Galactic disk, investigating the age-dependence on the strength of these variations and showcasing similar trends in elements beyond  $[\text{Fe}/\text{H}]$ .

### 2023 SDSS-V Collaboration Meeting

August 2023

*Sloan Digital Sky Survey-V*

Gave a talk on my work using APOGEE DR-17 to uncover chemical azimuthal variations in the Galactic disk, investigating the age-dependence on the strength of these variations and showcasing similar trends in elements beyond  $[\text{Fe}/\text{H}]$ .

### Stellar Properties from NLTE Radiative Transfer

May 2023

*IReNA, the Kavli Institute for Cosmological Physics, and the University of Chicago*

Presented an investigation-themed talk containing results of my previous work on star 2MASS J00101758–1735387 as well as highlighting the steps that need to be taken to answer long-standing questions about the formation of the Milky Way.

**AAS Meeting Presentation**

January 2021

*American Astronomical Society*

Submitted an abstract highlighting the methodology and results of my work on a metal-poor, r-process enhanced star, 2MASS J00101758–1735387. My iPoster on this work was presented as a part of the 2021 American Astronomical Society meeting.

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**OUTREACH AND SCIENCE COMMUNICATION**

**Astronomy on Tap Talk**

February 2025

*Astronomy on Tap, Austin, TX*

Engaged the public in an investigation-themed talk covering the metallicity of stars in the Milky Way disk and the formation history of our Galaxy.

**UT STEM Girl Day**

February 2023 - 2025

*University of Texas at Austin*

Led an interactive build-your-own-pulsar activity for the astronomy booth at STEM Girl Day, an annual event that the university puts on to encourage thousands of children to engage in science, technology, engineering, and math.

**Astronomy Club Presentation**

November 2024

*Williamson County Astronomy Club*

Gave a public talk at a library in Georgetown for the Williamson County Astronomy Club about stellar spectroscopy and how we can use the light from stars to piece together the formation history of the Milky Way.

**Board of Visitors Summer Meeting**

July 2024

*McDonald Observatory and Department of Astronomy*

Gave a public talk at the McDonald Observatory and Department of Astronomy Board of Visitors meeting about stellar spectroscopy, Galactic archaeology and the peculiar chemistry of the Galactic disk.

**Girl Scout Presentation**

April 2022

*Daisy Troop 41119*

Presented an interactive talk about the basics of the Sun, the Moon and the stars to a group of first grade girls in the Girl Scouts of the USA.

**SEFS Presentation**

February 2021

*Western Pines Middle School*

For the Scientist in Every Florida School (SEFS) Program, I presented a 30 minute long talk to eighth grade students about stellar evolution and astronomy.

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**LEADERSHIP AND EXTERNAL ACTIVITIES**

**Recruitment Officer**

2023-2025

*Department of Astronomy, University of Texas at Austin*

I was elected to lead the recruitment of prospective graduate students of the Department of Astronomy. This culminates in the organization of the Prospective Visit, when the potential students travel to Austin for a weekend full of tours and welcoming activities.

**AoT ATX Social Media Manager**  
*Astronomy on Tap, Austin, TX*

2023-Present

I manage the social media accounts and campaigns for the Austin, Texas chapter of Astronomy on Tap, a monthly public outreach event that hosts Astronomy talks at local breweries.

COMPUTATIONAL EXPERIENCE

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**Programming**  
**Software**

Python, C++, GitHub  
BACCHUS, Turbospectrum, Spectroscopy Made Hard

PROFESSIONAL EXPERIENCE

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**Wellness Concierge**  
*TruFusion South Austin*

April 2024 - Present

Provided front-desk customer service, managed studio operations, and ensured a welcoming environment for members. Responsibilities included membership sales, facility upkeep, and assisting with class logistics. Developed strong teamwork and communication skills while upholding studio standards and enhancing the member experience.

**Engineering Scientist Associate**  
*Applied Research Laboratories at the University of Texas at Austin*

August 2021 - August 2022

Worked in the Space and Geophysics Laboratory performing quality assurance and testing on High Rate Tracking Receivers deployed on numerous GPS satellites. This included assisting in the definition and implementation of testing and automation programs, generating and executing test cases, as well as providing technical interface to sponsors and other external organizations.