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EDUCATION

M.A., Astronomy; Minor, Physics

May 2022

PhD., Astronomy

Anticipated August 2025

Thesis Title: Exploring Environmental Dependence on the Evolution of Galaxies out to $z \sim 0.5$

Advisor: Provost Prof. John J. Salzer; Location: Indiana University

B.S., Astronomy, B.S., Physics, B.S., Mathematics

May 2019

Honors Thesis Title: A Recipe for Green Pea Environments

Advisor: Provost Prof. John J. Salzer; Location: Indiana University

RESEARCH EXPERIENCE

Summary: I have six years of experience in reducing, measuring, and analysing spectral data, and seven years of experience of Python scripting for analysing the data.

Exploring the Environments of Star-Forming Galaxies (SFGs)

2021 - Present

Advisor: Provost Prof. John J. Salzer; Location: Indiana University

- Collaborating with team members on a narrow-band imaging survey, Star Formation Across Cosmic Time (SFACT).
- Utilizes WIYN 3.5m, Hydra (a multi-fiber positioner), and a bench spectrograph for observing spectral data.
- Exploring environmental impact on star-forming galaxies (SFGs) detected by SFACT.
- Conducting a spectral redshift survey in SFACT fields for galaxy environment study and clustering comparison sample.
- Reducing and measuring spectral data obtained by SFACT and redshift survey.
- Created a database and a database management scheme for storing the spectral data properties and measurements.

Does local galactic environment affect abundances and star-formation rates of SFGs?

2019 - Present

Advisor: Provost Prof. John J. Salzer; Location: Indiana University

- Analyzing the relationship between abundance, local galactic environment, star formation rates, and redshift of a large sample of star-forming galaxies (SFGs) out to a redshift of 0.5, now including SFACT galaxies.
- Properties are derived using spectral data collected and processed by me and others from WIYN 3.5m and Hydra.
- Abundance derivations utilize spectral lines ratios, the R23 and the O3N2 method.
- Density derivations utilize a Monte-Carlo Sample Mean method in Python.

Exploring the environments of Green Pea Galaxies

2018 - Present

Advisor: Provost Prof. John J. Salzer, Dr. Samantha Brunker; Location: Indiana University

- In undergrad, I reduced spectral data taken by the WIYN 3.5m and Hydra, by utilizing a pipeline in IRAF (Image Reduction and Analysis Facility) called *dohydra*.
- I measured over 800 new spectral redshifts of galaxies using a cross-correlation method.
- I am now analyzing the local galactic environments to understand whether galaxy environment is the main factor that causes the extreme star-formation rate of “Green Pea” galaxies.

How do starspots on LO Pegasi, a sun-like star, change over time?

Summer 2018

Advisor: Prof. Robert Harmon; Location: Ohio Wesleyan University

- National Science Foundation Research Experience for Undergraduates for 8 weeks.
- Acquired, reduced and analyzed imaging data to produce light curves of a variable star, LO Pegasi, in order to map its starspots to a 2D model and compared results to previous years to show how starspot changed over the course of several years.
- Presented results in an American Physical Society poster presentation in April 2019 and at the Patricia Belt Conrades Summer Science Research Symposium in July 2018.

Learning IRAF and Python through studying globular clusters

Summer 2017

Advisor: Prof. Katherine Rhode; Location: Indiana University

- Using imaging data, I mastered Python and IRAF to analyze globular cluster candidates in external galaxies.
- My work was part of a larger project working with globular clusters to study galaxy formation and evolution.

HONORS AND AWARDS

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| Indiana Space Grant Consortium (INSGC) Doctoral Fellowship (TBD) | 2024-2025 |
| College of Arts & Sciences Dissertation Research Fellowship (\$22,000) | 2024-2025 |
| Dr. Benjamin F. Peery, Jr Diversity Award (\$500) | 2024 |
| AAS FAMOUS Travel Grant (\$1,000) | 2024 |
| 2024 Executive Dean's Travel Award for Women in Science (\$750) | 2024 |
| Sullivan Graduate Fellowship (\$26,000) | 2023-2024 |
| Indiana Space Grant Consortium (INSGC) Doctoral Fellowship (\$12,000) | 2023-2024 |
| McCormick Science Grant (\$3,500) | 2023 |
| Goethe Link Prize for Outreach & Public Education in Astronomy (\$500) | 2022 |
| Indiana Space Grant Consortium (INSGC) Master's Fellowship (\$6,000) | 2021 |
| Research Scholarship Award (\$1,500) | 2019 |
| Hollis & Grete Johnson Research Prize (\$400) | 2019 |
| 21 st Century Scholarship (Full Tuition Covered) | 2009 - 2010, 2017 - 2019 |
| IU Presidential Scholarship (\$5,500/year) | 2009 - 2010 |

CONTRIBUTED RESEARCH TALKS

- Study of Possible Environmental Dependence on Abundances and Star Formation Rates of Galaxies out to $z \sim 0.5$:** (1) Indiana Astronomical Society, May 2022.
- WIYN: Spectroscopy:** (1) Indiana University Physics and Astronomy Lab Tour TED talk, September 2021
- A Recipe for Green Pea Environments:** (1) Indiana University Honors Thesis, April 2019
- Starspots on LO Pegasi:** (1) Ohio Wesleyan University Lunch Talk, July 2018; (2) Patricia Belt Conrades Summer Science Research Symposium at Ohio Wesleyan University, July 2018; (3) Indiana University Lunch Talk, September 2019

REFERRED PAPERS

- [1] Brunker, S.W., Salzer, John. J., **Kimsey-Miller, B.**, and Cousins, B. *The Environments of Green Pea Galaxies. I. The KISS Sample*, 2022, The Astrophysical Journal, 926, 131.

CONTRIBUTED RESEARCH POSTERS

- [1]**Kimsey-Miller, B.**, Salzer, J., Brunker, S., Carr, D., Sieben, J., *Exploring the Environments of SFACT Star-forming Galaxies*. American Astronomical Society Meeting 2024 Jan 7-11; New Orleans, LA. [2024AAS...24330615K](#), Presenter
- [2]Epps, M., Brady, K., **Kimsey-Miller, B.**, Pilachowski, C., *Determining the age, distance, and metallicity of the M44 star cluster (the Beehive Cluster) using isochrone fitting on a Hertzsprung-Russel diagram*. Jim Holland Summer Science Research Symposium, Contributor
- [3]Jewell, A., **Kimsey-Miller, B.**, Harmon, R. O., *Starspots on LO Pegasi*. American Physical Society April Meeting 2019; Denver, CO. [Volume 64, Number 3](#), Presenter
- [4] Brunker, S. W., **Kimsey-Miller, B.**, Cousins, B., Salzer, J. *Probing the Environments of Extreme Star-Forming Galaxies*. American Astronomical Society Meeting 2019 Jan 6-10; Seattle, WA. [2019AAS...23336801B](#), Contributor

OBSERVING EXPERIENCE

- WIYN3.5m Telescope in Kitt Peak, AZ** Fall 2021-Present
- Observed with Hydra and the One Degree Imager (ODI) with Prof. Salzer and other SFACT team members.
 - 42 nights of observing on-site (9) and off-site with ODI and Hydra.
- Perkins Observatory in Delaware, Ohio** Summer 2018
- Performed CCD camera observations on the 14-inch reflector campus research telescope.
 - 5 nights, to acquire data for summer NSF REU research project.

SKILLS

Python, bash, Anaconda, IRAF, JupyterLab, Docker, SQL, ROOT, L^AT_EX, Mathematica, Microsoft Office, Mira, github, GoogleCoLab, Google Drive, MaxIM DL, Adobe Photoshop

TEACHING EXPERIENCE

Instructor of Record at Indiana University

Online introductory course for non-majors, 30 students.

Responsibilities: Grading, holding office hours, providing feedback, and inputting final grades.

- **A105: Stars and Galaxies** Summer 2023
– *Topics included:* The formation and evolution of stars, galaxies, and the universe.
- **A100: The Solar System** Summer 2022
– *Topics included:* The formation of the solar system and different properties of the planets and moons.
- **A107: The Art of Astronomy** Summer 2021
– *Topics included:* The electromagnetic spectrum and creating images from broadband and narrowband images.

Associate Instructor at Indiana University

Responsibilities: Grading, attending class, holding office hours, and giving feedback to high number of students.

- **A103: Search for Life in the Universe** Fall 2020
– Online Introductory course for non-majors, 200 students.
– *Topics included:* How life began on Earth and habitable environments.
- **A105: Stars and Galaxies** Spring 2019, 2020, 2021
– In-person introductory course for non-majors; up to 250 students.
– *Topics included:* The properties, formation, and evolution of stars and galaxies and the origin and fate of the Universe.
- **A107: The Art of Astronomy** Fall 2019
– Online introductory course for non-majors; up to 120 students.
– *Topics included:* Photoshop, stacking and colorizing images, the Moon and Sun, comets, stars, galaxies, and cosmology.

Guest Lecturer

- **A115: Birth and Death of the Universe** Spring 2023
– In-person guest lecturer on the general properties, environments and evolution of spiral, elliptical, and irregular galaxies.

Undergraduate Grader at Indiana University

Responsibilities: Grading and providing feedback on homework.

- **J112: Intro to College Math II** 2018-2019
– In-person introductory course for non-majors, up to 40 students.
– *Topics included:* Algebraic operations and equations; functions and graphing; polynomials; exponential and logarithmic functions.

Tutoring at Indiana University

Responsibilities: Helping students work through their course material to improve their understanding.

- **A115: Birth and Death of the Universe** Spring 2021
- **A105: Stars and Galaxies** Fall 2023

OUTREACH

Astronomy Department Outreach Coordinator at Indiana University

2021 - 2023

- *Responsibilities Included:*
 - Working closely with Event Coordinators, Department Chair, Group Presidents, and Instructors to develop and plan Outreach Events presented by the Indiana University Astronomy Department.
 - Building relationships with departments outside Astronomy to encourage annual Outreach events.
 - Running the departmental Twitter account to promote sciences to the general public.
 - Encouraging graduate students to participate in events by planning exciting opportunities for their professional development through Outreach.
- *Events Organized Include, but not limited to, the following:*
 - Science Fest 2022: University-wide festival celebrating the sciences by presenting activities for children to do. Largest Science Fest to date, with over 3000 attendees.
 - Science Fest 2021: Created two new activities with several other staples. Many safety precautions taken because target age group could not be vaccinated against COVID at the time it was hosted.
 - mid-Autumn Festival: Tour of Kirkwood Observatory for members of a photography group celebrating their Chinese holiday.
 - Numerous private Kirkwood Observatory Tours for organizations at different age and grade levels, as well as for individuals, such as a maternity photo-shoot and a graduation photo-shoot.
 - The department's first invitation to the Children's Museum of Indianapolis for their STEM day with a tabletop activity.

OUTREACH CONTINUED

Diversity Committee

2020 - 2022

- Member of the newly created Diversity committee in the Indiana University Astronomy Department.
- Building a more inclusive environment through identity and belonging.

AIP's TEAM-UP Project

2020 - Present

- Recruiting and retaining Black and African-American Astronomers and Physicists.
- Building relationships with underrepresented communities outside our department to foster belonging.

Other Outreach Events

- ***Total Solar Eclipse Outreach Talks, Seymour, IN*** Spring 2024
 - Presented two 30 minute talks on the total solar eclipse at Valeo, a local factory.
- ***Solar Lab, Bloomington, IN*** Fall 2023
 - Participated in the Solar Lab tours within Kirkwood Observatory.
 - Discussed sunspots, spectroscopy, and telescopes.
- ***Eclipse Workshop: Train the Trainer, Bloomington, IN*** Fall 2023
 - Workshop designed for local teachers to better prepare for the upcoming eclipses, October 2023 and April 2024.
 - Helped build a solar viewer, set-up, and tear down for the workshop.
- ***Vienna-Finley Elementary School: Space Day, Remote*** Fall 2023
 - Designed and presented an online presentation for k-5 students on filters using red and blue gels.
- ***Private Kirkwood Observatory Tours, Bloomington, IN*** 2021-2023
 - Gave small private Kirkwood Observatory tours for organizations.
 - Organizations include IU Foundations, a high school Earth & Space Science and Physics class, Association for Cultural Economics International (ACEI) Conference held for international visitors, and the Boys & Girls Club.
- ***GEMS (Girls in Engineering, Math, and Science), Bloomington, IN*** Spring 2023
 - Table-top activity explaining why and how filters are used in Astronomy for junior-high gender minorities.
- ***Children's Museum STEM Exploration Day, Indianapolis, IN*** Fall 2022
 - Table-top activity for 200+ children at the Children's Museum of Indianapolis (the world's largest children's museum).
 - Taught children to think critically by packing a space telescope (JWST) into a cylindrical tube (the Ariane5 Rocket).
- ***Jim Holland Research Initiative in STEM Education (RISE), Bloomington, IN*** Summer 2021
 - Gave two online talks on gravitational waves to groups of four high-achieving, underrepresented high-school students.
 - Interactive learning by fitting LIGO data in order to approximate a mass and distance to the black-hole mergers.
- ***GEMS (Girls in Engineering, Math, and Science) Bloomington, IN*** Spring 2021
 - Developed and presented four online talks to groups of 7-8 middle-school girls on the use of astronomical filters.
 - Interactive learning: students looked at astronomical images through red and blue gels. Stacked and colorized their own astronomical images and presented them to everyone in the group.
- ***Bartholomew County Public Library, Columbus, IN*** Winter 2019
 - Event 1: Planned and presented an experiment utilizing a simple circuit for adults and children to learn about electric potential and Ohm's Law.
 - Event 2: Planned and presented lunar phase activity with Oreo's; observed the Moon through an 8-in reflector telescope.
- ***Kirkwood Observatory Open House, Bloomington, IN*** 2019-Present
 - Co-host public observing nights, with a typical attendance of 60 people, on a 12-inch refractor for the local community.
 - The moon, planets, and a few Messier objects are the main objects viewed.
- ***Science Fest, Bloomington, IN*** 2017-2021
 - Participate in annual outreach science festival that provides hands-on science activities for children.
 - *Activities led:* Making Comets, Astronomy Trivia, Kirkwood Observatory Tour
- ***Solar Eclipse, Nashville & Bloomington, IN*** 2017
 - I and two colleagues explained solar eclipses to 7 groups of 20 elementary school children during day long event.
 - I and two colleagues visited a local middle school to explain solar eclipses to a science class.