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# Brooke Kimsey-Miller (she/her)

Astronomy Department, Indiana University  
727 E. 3<sup>rd</sup> Street  
Bloomington, IN 47405

Email: [bkkimsey@iu.edu](mailto:bkkimsey@iu.edu)  
Phone: (812) 498-9120  
Website: <https://brookekimsey.github.io/>

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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

Indiana Space Grant Consortium (INSGC) Doctoral Fellowship (TBD)	2024-2025
College of Arts & Sciences Dissertation Research Fellowship (\$23,000)	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 <sup>st</sup> 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<sup>A</sup>T<sub>E</sub>X, 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.