Brooke Kimsey-Miller (she/her)

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EDUCATION

M.A., Astronomy; Minor, Physics — Anticipated May 2022
PhD., Astronomy — Anticipated August 2024
Advisor: 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: Prof. John J. Salzer; Location: Indiana University

SKILLS

Python, bash, Anaconda, ROOT, LaTeX, Mathematica, IRAF, Microsoft Office, Mira, Google Drive, MaxIM DL

RESEARCH EXPERIENCE

Metallicity Evolution of Emission-Line Galaxies (ELGs) — 2021 - Present
Advisor: Prof. John J. Salzer; Location: Indiana University
- Collaborating on the Star Formation Across Cosmic Time (SFACT) survey, a new deep, large narrow-band survey.
- Utilizes WIYN 3.5m, Hydra (a multi-fiber positioner), and a bench spectrograph.
- Exploring emission-line galaxies in order to understand galaxy evolution and formation with a focus on chemical enrichment.

Does local galactic environment affect abundances of ELGs? — 2019 - Present
Advisor: Prof. John J. Salzer; Location: Indiana University
- Analyzing the relationship between abundance, density, star formation rates, and redshift of a large sample of emission-line galaxies and with redshift between 0.035 and 0.5.
- Using reduced spectroscopic data from WIYN 3.5m and Hydra.
- Abundance derivations utilize the McGaugh grid and the O3N2 method. Density derivations utilize a Monte-Carlo Sample Mean method. Entirely coded in Python.

Reducing Hydra data to help understand Green Peas — 2018 - 2019
Advisor: Prof. John J. Salzer; Location: Indiana University
- Reduced and analyzed spectroscopic data taken with the WIYN 3.5m and Hydra through Image Reduction and Analysis Facility (IRAF) using `dohydra` pipeline.
- Measured over 800 new spectroscopic redshifts of galaxies using cross-correlation method.
- My work is part of an ongoing larger project aimed at analyzing 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 data to produce light curves of a variable star, LO Pegasi, in order to map its starspots to a 2D model. 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
- Mastered Python scripting and working with IRAF tasks and ds9 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) 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

TEACHING EXPERIENCE

Instructor of Record at Indiana University

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

- ***A107: The Art of Astronomy*** Summer 2021
  - Online introductory course for non-majors, 30 students.
  - *Topics included*: The electromagnetic spectrum and using Photoshop to create aesthetically pleasing 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.

Undergraduate Grader at Indiana University

Responsibilities: Responsibilities included 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.

OBSERVING EXPERIENCE

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.

OUTREACH

Outreach Coordinator at Indiana University 2021 - 2022

- *Responsibilities Included:*
  - Work closely with Event Coordinators, Department Chair, Group Presidents, and Instructors to develop and plan Outreach Events presented by the Indiana University Astronomy Department
  - Build relationships with departments outside Astronomy to encourage annual Outreach events.
  - Running the departmental Twitter account to promote sciences to the general public.
  - Encourage graduate students to participate in events by planning exciting opportunities for their professional development through Outreach.
- *Events Included:*
  - Science Fest: University-wide festival celebrating the sciences by presenting activities for children to do. 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.

Diversity Committee & AIP's TEAM-UP Project 2020 - Present

- Member of the newly created Diversity committee in the Indiana University Astronomy Department.
- Recruiting and retaining Black and African American Astronomers and Physicists.
- Building a more inclusive environment through identity and belonging.
- Building relationships with minority groups outs

Other Outreach Events

- ***Jim Holland Research Initiative in STEM Education (RISE)***, *Bloomington, IN* Summer 2021
  - Presented two online talks about gravitation waves to groups of 4 high achieving 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* 2019,2021
  - 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-Present
  - Participate in annual outreach science festival that provides hands-on science activities for children.
  - *Activities led:* Making Comets, Astronomy Trivia, Kirkwood 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.

CONTRIBUTED RESEARCH TALKS

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

CONTRIBUTED RESEARCH POSTERS

[1]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
[2] 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

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*, Submitted September 2021.