David J. Carr

CONTACT INFORMATION

Indiana University
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RESEARCH INTERESTS

Active galactic nuclei demographics and star formation across cosmic time; numerical and computational methods in scientific computing; data mining and machine learning algorithms as applied to scientific research

EDUCATION

Indiana University 2016 – Present
Doctor of Philosophy in Astronomy, (Expected Graduation May 2021)
Minor: Scientific Computing
Thesis: *Discovering Active Galaxies Across Cosmic Time with the SFACT Survey* (Advisor: Dr. John Salzer)
Master of Arts in Astronomy Spring 2019

University of Wisconsin-Madison 2012 – 2016
Bachelor of Science in Astronomy-Physics and Physics, 2016
Minor: Mathematics
Graduated with Distinctive Scholastic Achievement and Honors in Liberal Arts

RESEARCH EXPERIENCE

Graduate Thesis Research, Indiana University September 2016 – Present
Advisor: Dr. John Salzer
Leader in the Star Formation Across Cosmic Time (SFACT) survey using the WIYN 3.5-meter telescope at Kitt Peak National Observatory to find star-forming galaxies and active galactic nuclei across cosmic time. Constructed CLOUDY models of active galactic nuclei spectra to determine if abundances in the nuclei of galaxies change across cosmic time.

Research Assistant, University of Wisconsin-Madison June 2014 – May 2016
Advisor: Dr. Sebastian Heinz
Converted program written in IDL to Python to model what different objects look like through different telescopes and simulate data gathered from observing these objects. Planned to use this code to conclude which objects are worth observing and determine which telescope is best used to observe them.

Astronomy Research Project, University of Wisconsin-Madison September 2014 – December 2014
Advisor: Dr. Snezana Stanimirovic
Worked to determine the Milky Way's rotation curve, calculate the total mass of the Milky Way and calculate the dark matter component of the Galaxy. Presented the project with my group members at the Undergraduate Research Symposium held at UW on April 16th, 2015.

Research Assistant, University of Wisconsin-Madison January 2013 – May 2014
Advisor: Dr. Matt Bershady
Developed radiative transfer models of edge-on spiral galaxies, specifically NGC 891, to learn more about its structure.

COMPUTING SKILLS

Programming Languages: Python, R, SQL, Java, html, IDL, Linux/Unix shell scripting
Software: LaTeX, IRAF, CLOUDY, Mathematica, and Microsoft Office Suite
Data Mining Algorithms: ID3, k-means, SVM, EM, Decision trees

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TEACHING EXPERIENCE

Instructor, Indiana University — Summer 2018 and 2019
Classes: A105: Stars and Galaxies (in person, 20 students), A107: The Art of Astronomy (online, 25 students)
Designed and taught introductory astronomy courses. Solely responsible for creating lectures, slides, exams, and homework. Responsibilities included holding office hours, grading, running extra credit opportunities, and in class demonstrations.

Associate Instructor, Indiana University — Fall 2016 – Present
Classes: A100: The Solar System, A103: The Search for Life in the Universe, A105: Stars and Galaxies, A115: Birth and Death of the Universe
Assistant to the instructor for classes of 200 or more students. Responsibilities included hosting review sessions, holding office hours, grading, running rooftop and solar lab observing sessions, attending all classes.

Private Tutor, University of Wisconsin-Madison & Indiana University — September 2013 – 2017, May 2019 – Present
Tutored students in astronomy, physics, and math courses. Reviewed notes covered in class, discussed challenging topics.

PUBLIC AND COMMUNITY OUTREACH

Kirkwood Observatory Public Tours and Solar Lab Sessions, Indiana University — Fall 2016 – Present
Host evening public observing and afternoon solar observing sessions for the Bloomington, IN community. Give private tours of the observatory for local school and campus groups.

Indiana University Science Fest, Indiana University — October 2016, 2017, 2018
Volunteered for IU Science Fest. 2016: Demonstrated the Kirkwood solar telescope for the public; 2017: Ran the Oreo Moon Phase station; 2018: Ran the Virtual Reality station and 3D television.

Indiana Science Olympiad, Indiana University — March 2017, 2018, 2019
Volunteered for state wide Science Olympiad. 2017: Wrote exam questions; 2018 & 2019: Wrote exam questions and graded exams.

CONFRENCES, PRESENTATIONS, AND WORKSHOPS

1. "DRAGONS: clouDy nebulaR line diAGnostics acrOss the electromagNetic Spectrum" — May 2019
Authors: **Carr, D. J.**, Garg, P., Holguin, F., Olivier, G. M.
Poster presentation at the 2019 Cloudy Workshop in Lexington, KY

2. "The SFACT Survey - Star Formation Across Cosmic Time" — January 2019
Authors: Sieben, J., Salzer, J. & **Carr, D. J.**
Poster presented at: 233rd American Astronomical Society Meeting in Seattle, WA.

3. "Review of the Unified Model for Active Galactic Nuclei and Quasars" — November 2016
Talk given at Indiana University

4. "Calculating the Galactic Rotation Curve of the Milky Way" — April 2015
Authors: Fulmer, L., Bennet, C., **Carr, D. J.**, Heup, J., Mayeshiba, J., Stanimirovic, S.
Poster presentation at the University of Wisconsin Undergraduate Research Symposium

OBSERVING EXPERIENCE

WIYN 3.5m telescope, Kitt Peak National Observatory — 2013 – 2014, 2017 – Present
50+ nights for graduate research and 10 nights for undergraduate research

HONORS AND AWARDS

College of Arts and Sciences Travel Award — Spring 2019

PROFESSIONAL MEMBERSHIPS

American Astronomical Society — September 2016 – Present

REFERENCES

Dr. John Salzer
Indiana University
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Dr. Caty Pilachowski
Indiana University
Daniel Kirkwood Chair
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