Brandon Radzom

PhD Candidate · Astronomy

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Education

Indiana University (IU) - Bloomington *Bloomington, IN 47405-7000*

PhD Astronomy *Aug. 2020 - May 2025 (anticipated)*

- Minor: Scientific Computing
- Advisor: Dr. Songhu Wang
- Course highlights: Orbital Dynamics & Exoplanets, Numerical Analysis, Computational Physics

University of Wisconsin (UW) - Madison *Madison, WI 53706-1507*

B.S. Astronomy-Physics, B.S. Physics *Sept. 2016 - May 2020*

- Minor: Computer Sciences
- Distinctions: Thesis of Distinction Award, Lowell Doherty Award for Excellence in Astronomy
- Thesis title: *Characterizing AGN Activity in the SSA22 Field*
- Advisor: Dr. Amy Barger

Research Experience

Planetary Science Summer School Student, NASA Jet Propulsion Laboratory *Pasadena, CA*

THUNDER: A New Frontiers-class Titan Orbiter *2023*

- Worked with program cohort to develop THUNDER (Titan's Hydrocarbons: Uncovering New Dimensions of Evolutionary pRocesses), a novel mission concept for an orbiting satellite at Titan in response to the New Frontier 5 Announcement of Opportunity (AO) and the 2023 Planetary Science Decadal. Acted as Deputy PI, Science Chair, and Science Objective Lead. Developed the science case and requirements related to liquid hydrocarbon transport and evolution, surface processes, and cratering.
- Mentors: Dr. Alfred Nash, Dr. James Keane Tuttle
- Manuscripts: Seltzer, Lien, & Radzom et al. submitted to PSJ.

Graduate Research Assistant, IU-Bloomington, Dept. of Astronomy *Bloomington, IN*

Stellar Obliquities of Giants in Compact Multi-Planet Systems *2021-Present*

- Measure the stellar obliquities of sub-Saturns and hot Jupiters in compact multi-planet systems via the Rossiter-McLaughlin effect. Test primordial alignment and provide constraints on misalignment mechanisms and the dynamical histories of giants.
- Data: WIYN/NEID
- Manuscripts: Radzom et al. (2024) accepted to AJ, Radzom et al. in prep.

The Nearby Companion Rate of Hot Saturns

- Utilize advanced algorithms to search for significant transit-timing-variation signals for hot Saturns caused by the presence of nearby companions. Provide the first constraints on the nearby companion rate for these short-period sub-giants. Manuscript in prep.
- Data: *Kepler* (NASA Exoplanet Database)
- Manuscripts: Radzom et al. in prep.

Post-disk Dynamical Evolution of Short-period Gas Giants in Multi-planet Systems

- Observationally-motivated N-body investigation of hot and warm Jupiter companion properties assuming quiescent origins.
- Data: REBOUND (N-body)
- Manuscripts: Radzom et al., submitted to ApJ.

Undergraduate Research Assistant, UW-Madison, Dept. of Astronomy *Madison, WI*

X-ray Sources in the SSA22 Field *2019-2022*

- Combined photometric and spectroscopic data to construct 2-8 keV X-ray luminosity functions (LFs) over the redshift range $z = 0.25 - 4$ for Active Galactic Nuclei (AGN) and other extragalactic objects in the Hawaii Deep Survey Field SSA22. Used these data to constrain AGN activity across cosmic time and publish an updated source catalog for the field.
- Data: *Chandra*/ACIS X-ray, Subaru $BVRiz$, Subaru/HSC $Ugrizy$, Keck/DEIMOS optical spectroscopy, UKIRT J & K NIR, *Spitzer* IRAC IR
- Manuscripts: Radzom et al. (2022) published to ApJ.

Undergraduate Research Assistant, UW-Madison, Dept. of Physics *Madison, WI*

Developing a Temperature Regulation System for an Atomic Trap *2017-2020*

- Designed, built, tested, and implemented a PID-controlled temperature regulation system for an atomic trapping chamber used for quantum computation.

Minimizing Polarization Drift in a Polarization Maintaining Optical Fiber With a Dispersive Measurement

- Devised, constructed, and documented a novel device and associated methodology for polarization alignment in birefringent optical fibers. Write-up is internal to Dr. Mark Saffman's laboratory group.

Skills & Competencies

Programming Languages

- Python, Unix/Linux shell, HTML, Java, C++, LabView

Software

- git & GitHub, LaTeX, VS Code, spyder, jupyterlab, MATLAB, Mathematica, Maple, EAZY & LePHARE
- Python packages: `allesfitter, pymc, rebound, lightkurve`

Awards, Fellowships, & Grants

2024	**Frank and Margaret Edmondson Prize for Teaching**, IU-Bloomington	*$500*
2023	**Goethe Link Prize for Outreach and Public Education in Astronomy**, IU-Bloomington	*$500*
2022	**College of Arts and Sciences Travel Award**, IU-Bloomington	*$200*
2020	**Thesis of Distinction**, UW-Madison College of Letters & Science	
	Lowell Doherty Award for Excellence in Astronomy, Dept. of Astronomy, UW-Madison	*$500*
	Member of the Dean's List, College of Letters & Science, UW-Madison	
2019	**Member of the Dean's List**, College of Letters & Science, UW-Madison	
	Liebenberg Family Undergraduate Research Scholarship, UW-Madison	*$ 2,000*
	David H. Durra Scholarship, UW-Madison	*$ 3,000*
2018	**John Karl Scholz Sophomore General Scholarship**, UW-Madison	*$ 500*
2017	**Member of the Dean's List**, College of Letters & Science, UW-Madison	
2016	**Memorial Scholarship**, Anoka High School	*$ 500*

Publications

Refereed

Cassandra Seltzer, Rudi Lien, **Brandon T. Radzom**, et al. 2024. *THUNDER: A Titan orbiter mission concept for the New Frontiers program*, submitted to PSJ

Brandon T. Radzom, Jiayin Dong, Malena Rice, Xian-Yu Wang, Samuel W. Yee, Tyler R. Fairnington, Cristobal Petrovich, Songhu Wang 2024. *Evidence for Primordial Alignment: Insights from Stellar Obliquity Measurements for Compact Sub-Saturn Systems*, accepted to AJ

Jack Lubin, Xian-Yu Wang, Malena Rice, Jiayin Dong, Songhu Wang, **Brandon T. Radzom**, et al. 2023. *TOI-1670 c, a 40 day Orbital Period Warm Jupiter in a Compact System, Is Well Aligned*, ApJL, 959 L5

Brandon T. Radzom, Songhu Wang, Bonan Pu, Malena Rice, Dong-Hong Wu 2023. *Post-disk Evolution of Short-Period Gas Giants in Compact Multi-planet Systems: A Mechanism to Produce the Observed Companionship Dichotomy*, submitted to ApJ

Brandon T. Radzom, Anthony J. Taylor, Amy J. Barger, Lennox L. Cowie 2022. *X-ray Sources in the Chandra Field SSA22*, ApJ, 940 114

Xian-Yu Wang, Malena Rice, Songhu Wang, Bonan Pu, Gudmundur Stefánsson, Suvrath Mahadevan, **Brandon T. Radzom**, et al. 2022. *The Aligned Orbit of WASP-148 b, the Only Known Hot Jupiter with a Nearby Warm Jupiter Companion, from NEID and HIRES*, ApJL, 926 L8

Non-Refereed

Brandon T. Radzom 2020. *Characterizing AGN Activity in the SSA22 Field*, Senior thesis submitted to the UW-Madison Dept. of Astronomy

Conference Posters

Brandon T. Radzom, et al. "Evidence for Primordial Alignment: Insights from Stellar Obliquity Measurements for Compact TESS Systems", 2024, TESS Science Conference III

Cassandra Seltzer, Rudi Lein, **Brandon T. Radzom**, et al. "THUNDER: A New Frontiers-class Titan orbiter mission concept from the NASA JPL Planetary Science Summer School", 2024, Lunar and Planetary Science Conference 2024

Brandon T. Radzom, Songhu Wang, and Bonan Pu. "In Situ Origins of Hot Jupiters", 2022, Emerging Researchers in Exoplanet Science VII, 10.5281/zenodo.6944743

Brandon T. Radzom, Amy J. Barger, and Anthony J. Taylor. "Characterizing AGN Activity in the SSA22 Field", 2020, American Astronomical Society Meeting #236, id.137.03

Minho Kwon, Christopher Young, Matthew Ebert, Sebastian Malewicz, **Brandon Radzom**, Thad Walker, and Mark Saffman. "Progress toward entanglement of atomic ensemble qubits via Rydberg blockade", 2018, International Conference on Atomic Physics

Presentations

Invited Talks

Measuring Stellar Obliquities To Constrain the Origins of Exoplanets. Fall 2023 WIYN Board Meeting, Virtual Event.

The X-ray Luminosity Function of Optically Narrow and Broad-line AGNs Out To $z \sim 4$. Fall 2020 Astronomy Lunch Talk, IU.

Contributed Talks

Evidence for Primordial Alignment: Insights from Stellar Obliquity Measurements for Compact Giant Systems. Emerging Researchers in Exoplanets IV, Cornell University.

Post-disk Dynamical Evolution: A Mechanism to Explain the Companionship Dichotomy Between Hot Jupiters and Warm Jupiters. Division on Dynamical Astronomy Meeting #54, Michigan State University.

In Situ Origins of Hot Jupiter Isolation. Great Lakes Exoplanet Area Meeting 2022, The Ohio State University.

Teaching Experience

Instructor of Record, IU-Bloomington, Dept. of Astronomy

Astronomy 100: The Solar System (Summer 2023 & 2024)

- Designed and instructed an online asynchronous 30-student course for non-majors that covers the components of our solar system, their origins, and exoplanets.
- Duties: Prepared, graded, and managed all course content, held office hours.

Associate Instructor, IU-Bloomington, Dept. of Astronomy

Astronomy 451: Stellar Astrophysics (Spring 2024)

- Assisted in teaching an in-person 20-student course for advanced astronomy majors. Course content includes stellar structure and evolution.
- Duties: Develop Python assignments, aid in lectures, grade assignments and exams, hold weekly in-person office hours.

Astronomy 305: Modern Observational Techniques (Fall 2023)

- Assisted in teaching an in-person 20-student course for advanced astronomy majors. Course content includes observational methods, photometry, spectroscopy, and associated data reduction & analysis.
- Duties: Attend lecture, grade assignments, hold weekly hybrid office hours.

Astronomy 100: The Solar System (Spring 2023)

- Assisted in teaching an in-person 180-student course for non-majors that covers the components of our solar system, their origins, and exoplanets.
- Duties: Graded assignments, held weekly virtual office hours, developed course material, prepared and gave a guest lecture.

Astronomy 107: The Art of Astronomy (Spring 2023, Fall 2020)

- Assisted in teaching an online ∼150-student course for non-majors covering the night sky, telescopes and cameras, light and color, and the science behind astronomical images.
- Duties: Graded assignments, held weekly virtual office hours, facilitated online discussions.

Astronomy 103: Search For Life In The Universe (Fall 2021)

- Assisted in teaching an in-person 178-student course for non-majors that covers the fundamentals of astronomy and explores the prospects for extraterrestrial life.
- Duties: Graded assignments, held weekly hybrid office hours, attended lectures

Astronomy 222: General Astronomy II (Spring 2021)

- Assisted in teaching an online 25-student course for majors that provides a quantitative introduction to stellar astrophysics, galaxy dynamics and observational and theoretical cosmology.
- Duties: Graded assignments, held weekly online office hours, attended lectures, proctored in-person exams.

Guest Lecturer, IU-Bloomington, Dept. of Astronomy

- Astronomy 100: The Solar System (Spring 2024)
- Astronomy 103: Search for Life in the Universe (Spring 2024)
- Astronomy 515: Exoplanets and Orbital Dynamics (Fall 2023)
- Astronomy 100: The Solar System (Spring 2023)

Mentoring

2024 **Alice-Palma Undergraduate Research Program**, Informal Mentor, IU *Bloomington, IN*
2023 **Alice-Palma Undergraduate Research Program**, Formal Mentor, IU *Bloomington, IN*

Outreach & Professional Development

Service and Outreach

2023-2024 **IU Astronomy Graduate Leadership**, Tea Talk Coordinator
2022-2024 **IU Astronomy Graduate Leadership**, Undergraduate Research Coordinator
2021-2024 **Kirkwood Observatory Open Nights**, Telescope operator & tour guide *Bloomington, IN*
2021-2024 **IU Science Fest**, Astronomy demo leader *Bloomington, IN*
2017-2024 **Miscellaneous Outreach Events**, see my website for more info *Bloomington, IN*
2019-2020 **UW-Madison Astronomy Club**, Vice President
2018-2019 **UW-Madison Astronomy Club**, Volunteer Coordinator

Development

2022-2024: Python for Astronomers Crash Course and Workshop Series, *IU Astronomy Dept.* Lead organizer for two novel event series hosted by graduate students covering various topics related to Python for IU undergraduates interested in astronomy or physics. Topics for both events include `anaconda` installation, `jupyter notebook`, logical operators, classes, functions, loops, I/O, plotting, integration, scientific packages (`numpy`, `astropy`, `scipy`), and more.

2023: NASA Planetary Science Summer School, *Jet Propulsion Laboratory (JPL)*. Was selected as part of a cohort of 18 graduate students and post-docs across various disciplines to engage in this 11-week program. For the first 10 weeks, I remotely received virtual training on planetary mission formulation from NASA mentors and worked with my cohort as Deputy PI and Science Objective Lead to design a New Frontiers-class orbiter to Titan (in response to the NF5 AO and 2023 Planetary Decadal). I assumed the role of Science Chair during the culminating week and worked with NASA's Team-X in person at JPL to finalize the mission design before undergoing a Portfolio Gate Review. The concept study has been submitted to the Planetary Science Journal.

2023: Code/Astro Software Engineering Workshop, *Northwestern University*. Was selected for and remotely participated in the 2023 Code/Astro Workshop which covered best practices for producing and publishing open-source astronomy software. Topics included managing Python environments, git and GitHub, de-bugging, releasing code to PyPI and GitHub, documentation of code (using Sphinx docstrings), software testing, and employing anti-discriminatory practices. In parallel, I worked with a small group to develop and publish a pip-installable package for planning public observing nights called `kirkwoodnight` (GitHub: `https://github.com/ag161920/kirkwoodnight/tree/main`, PyPI: `https://pypi.org/project/kirkwoodnight/`. Program link: `https://semaphorep.github.io/codeastro/`.

2021: Bring an Inclusive Mindset to Your Teaching, *IU Astronomy Dept.* Participant in a 90-minute virtual workshop discussing data-driven techniques to make your classroom more inclusive to all, especially members of minoritized groups.

Professional Memberships

American Astronomical Society (2020-2024)