Brianna J. Zawadzki

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Scientific Interests

Protoplanetary/debris disks, machine learning, evolution/formation of planetary systems, radio interferometry

Education

The Pennsylvania State University, University Park, PA — 2020-2023
Ph.D., Astronomy & Astrophysics

The Pennsylvania State University, University Park, PA — 2018-2020
M.S., Astronomy & Astrophysics — *GPA: 3.83*

Lycoming College, Williamsport, PA — 2014-2018
B.S., Physics (Minors: Astronomy, Mathematics) — *GPA: 4.0*

Research Appointments

Constraining vertical structures of debris disks in ARKS — Wesleyan University
Advisor: Dr. Meredith Hughes — *2023-present*

Regularized maximum likelihood imaging for ALMA — The Pennsylvania State University
Advisor: Dr. Ian Czekala — *2020-2023*

Migration traps as the root cause of the Kepler dichotomy — The Pennsylvania State University
Advisors: Dr. Eric Ford, Dr. Daniel Carrera — *2021-2022*

Rapid formation of super-Earths around low-mass stars — The Pennsylvania State University
Advisors: Dr. Eric Ford, Dr. Daniel Carrera — *2018-2021*

Detecting nonlinearity in binary star data — Lycoming College
Advisor: Dr. Christopher Kulp — *2018*

Using missing ordinal patterns to detect nonlinearity in time series data — Lycoming College
Advisor: Dr. Christopher Kulp — *2017-2018*

The connection between solar coronal cavities and solar filaments — Harvard-Smithsonian CfA
Advisors: Dr. Kathy Reeves, Dr. Nishu Karna, and Jakub Prchlik — *2017*

First-Author Publications

[5] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS) III: The Vertical Structure of Debris Disks*, **Brianna Zawadzki** et al. 2025, *accepted by A&A*.

[4] *exoALMA. IX. Regularized Maximum Likelihood Imaging of Non-Keplerian Features*, **Brianna Zawadzki** et al. 2025, ApJL, 984, L14.

[3] *Regularized Maximum Likelihood Image Synthesis and Validation for ALMA Continuum Observations of Protoplanetary Disks*, **Brianna Zawadzki**, Ian Czekala, Ryan A. Loomis, Tyler Quinn, Hannah Grzybowski, Robert Frazier, Jeff Jennings, Kadri M. Nizam, and Yina Jian 2023, PASP, 135 064503.

[2] *Migration traps as the root cause of the Kepler dichotomy*, **Brianna Zawadzki**, Daniel Carrera, and Eric Ford 2022, ApJ, 937, 53.

[1] *Rapid Formation of Super-Earths Around Low-Mass Stars*, **Brianna Zawadzki**, Daniel Carrera, and Eric Ford 2021, MNRAS, 503, 1.

Contributing-Author Publications

[27] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). X: Interpreting the peculiar dust rings around HD 131835*, Marija R. Jankovic et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[26] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). IX: Gas-driven origin for the continuum arc in the debris disc of HD 121617*, Philipp Weber et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[25] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). VIII: A dust arc and non-Keplerian gas kinematics in HD 121617*, Sebastian Marino et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[24] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). VII: Optically Thick Gas with Broad CO Gaussian Local Line Profiles in the HD 121617 Disc*, Aoife Brennan et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[23] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). VI: Asymmetries and Offsets*, Joshua Lovell et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[22] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). V: Comparison between scattered light and thermal emission*, Julien Milli et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[21] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). IV: CO Gas Imaging and Overview*, Sorcha MacManamon et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[20] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). II: The Radial Structure of Debris Discs*, Yinuo Han et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[19] *The ALMA survey to Resolve exoKuiper belt Substructures (ARKS). I: Motivation, Sample, Data Reduction and Results Overview*, Sebastian Marino et al. incl. **Brianna Zawadzki** 2025, *submitted to A&A*.

[18] *exoALMA. XVIII. Interpreting large scale kinematic structures as moderate warping*, Andrew Winter et al. incl. **Brianna Zawadzki** 2025, accepted.

[17] *exoALMA. XVII. Characterizing the Gas Dynamics around Dust Asymmetries*, Lisa Wölfer et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L22.

[16] *exoALMA. XVI. Predicting Signatures of Large-scale Turbulence in Protoplanetary Disks*, Marcelo Barraza-Alfaro et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L21.

[15] *exoALMA. XV. Interpreting the Height of CO Emission Layer*, Giovanni P. Rosotti et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L20.

[14] *exoALMA. XIV. Gas Surface Densities in the RX J1604.3–2130 A Disk from Pressure-broadened CO Line Wings*, Tomohiro C. Yoshida et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L19.

[13] *exoALMA. XIII. Gas Masses from N_2H^+ and $C^{18}O$: A Comparison of Measurement Techniques for Protoplanetary Gas Disk Masses*, Leon Trapman et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L18.

[12] *exoALMA. XII. Weighing and Sizing exoALMA Disks with Rotation Curve Modelling*, Cristiano Longarini et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L17.

[11] *exoALMA. XI. ALMA Observations and Hydrodynamic Models of LkCa 15: Implications for Planetary Mass Companions in the Dust Continuum Cavity*, Charles H. Gardner et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L16.

[10] *exoALMA. X. Channel Maps Reveal Complex 12CO Abundance Distributions and a Variety of Kinematic Structures with Evidence for Embedded Planets*, Christophe Pinte et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L15.

[9] *exoALMA. VIII. Probabilistic Moment Maps and Data Products Using Nonparametric Linear Models*, Thomas Hilder et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L13.

[8] *exoALMA. VI. Rotating under Pressure: Rotation Curves, Azimuthal Velocity Substructures, and Gas Pressure Variations*, Jochen Stadler et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L11.

[7] *exoALMA. V. Gaseous Emission Surfaces and Temperature Structures*, Maria Galloway-Sprietsma et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L10.

[6] *exoALMA. IV. Substructures, Asymmetries, and the Faint Outer Disk in Continuum Emission*, Pietro Curone et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L9.

[5] *exoALMA. III. Line-intensity Modeling and System Property Extraction from Protoplanetary Disks*, Andrés F. Izquierdo et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L8.

[4] *exoALMA. II. Data Calibration and Imaging Pipeline*, Ryan A. Loomis et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L7.

[3] *exoALMA. I. Science Goals, Project Design, and Data Products*, Richard Teague et al. incl. **Brianna Zawadzki** 2025, ApJL, 984, L6.

[2] *An extreme test case for planet formation: a close-in Neptune orbiting an ultracool star*, Guðmundur Stefánsson et al. including **Brianna Zawadzki** 2023, Science, 382, 6674, pp. 1031-1035.

[1] *Using missing ordinal patterns to detect nonlinearity in time series data*, Christopher W. Kulp, Luciano Zunino, Thomas Osborne, and **Brianna Zawadzki** 2017, Physical Review E 96, 022218.

Presentations

Jul 21, 2025 Talk	Northeast Star & Planet Formation Meeting, New Haven, CT *Characterizing Vertical Dust Structures in Debris Disks with ARKS*
Jun 15-20, 2025 Poster	Gordon Research Conference, South Hadley, MA *Characterizing Vertical Dust Structures in Debris Disks with ARKS*
Jun 14, 2025 Talk	Gordon Research Seminal, South Hadley, MA *Characterizing Vertical Dust Structures in Debris Disks with ARKS*
May 5-8, 2025 Poster	Planets on the Edge, Santa Barbara, CA *Characterizing Vertical Dust Structures in Debris Disks with ARKS*
Jan 30, 2025 Invited Poster	BASP Frontiers Conference, Villars-sur-Ollon, Switzerland *Searching for Protoplanets with ALMA Using RML Imaging Techniques*
Jan 14, 2025 Talk	AAS 245, National Harbor, MD *ARKS III: Vertical Dust Structures in Debris Disks*
July 24, 2024 Talk	Connecticut Exoplanet Picnic, Middletown, CT *Resolving Vertical Structures in Millimeter Debris Disk Observations with ARKS*
May 30, 2024 Talk	New York Area Exoplanets Meeting, New York, NY *Resolving Vertical Structures in Millimeter Debris Disk Observations with ARKS*
Apr 26, 2024 Invited Talk	Williams College, Williamstown, MA *Resolving Vertical Structures in Millimeter Debris Disk Observations with ARKS*
Apr 19, 2024 Talk	Center for Astrophysics | Harvard & Smithsonian, Cambridge, MA *Resolving Vertical Structures in Millimeter Debris Disk Observations with ARKS*
Apr 16, 2024 Talk	Columbia University, New York, NY *Resolving Vertical Structures in Millimeter Debris Disk Observations with ARKS*
Mar 25, 2024 Talk	Dust Devils: Debris Disks in the Sonoran Desert, Tucson, AZ *Resolving Vertical Structures in Millimeter Debris Disk Observations with ARKS*
Mar 18, 2024 Poster	Extreme Solar Systems V, Christchurch, New Zealand *A High-Resolution View of Planet Formation Signatures in exoALMA Protoplanetary Disks*
Mar 5, 2024 Talk	Monash Stars and Planets Seminar, Melbourne, Australia *A High-Resolution View of Planet Formation Signatures in exoALMA Protoplanetary Disks*
Feb 6, 2024 Talk	Yale Astronomy Exoplanets & Stars Seminar, New Haven, CT *A High-Resolution View of Planet Formation Signatures in exoALMA Protoplanetary Disks*
Jan 12, 2023 Talk, Virtual	VLTI and ALMA Synthesis Imaging Workshop, Garching, Germany *RML Imaging Techniques for ALMA Protoplanetary Disk Observations*
Oct 12, 2022 Poster	Institute for Computational and Data Sciences Symposium, State College, PA *Regularized Maximum Likelihood Techniques for ALMA*

May 31, 2022 Talk	APEx Exocoffee, Heidelberg, Germany *Regularized Maximum Likelihood Techniques for ALMA*
May 3, 2022 Talk	Exoplanets IV Conference, Las Vegas, NV *Migration Traps as the Root Cause of the Kepler Dichotomy*
May 2, 2022 Poster	Exoplanets IV Conference, Las Vegas, NV *Regularized Maximum Likelihood Techniques for ALMA*
Feb 25, 2022 Talk, Virtual	Submillimeter Array (SMA) Science Seminar *Regularized Maximum Likelihood Techniques for ALMA*
Oct 6, 2021 Talk	North American ALMA Science Center, Charlottesville, VA *Regularized Maximum Likelihood Techniques for ALMA*
May 26, 2021 Talk, Virtual	Emerging Researchers in Exoplanet Science Conference *Regularized Maximum Likelihood Techniques for ALMA Spectral Line Imaging*
Sep 28, 2020 Poster, Virtual	Europlanet Science Congress *Rapid Formation of Super-Earths Around Low-Mass Stars*
Jul 29, 2020 Poster, Virtual	Exoplanets III Conference *Rapid Formation of Super-Earths Around Low-Mass Stars*
Jul 29, 2019 Poster	TESS Science Conference, Cambridge, MA *Rapid Formation of Super-Earths Around Low-Mass Stars*
Feb 11, 2019 Talk	The Pennsylvania State University, State College, PA *Rapid Formation of Super-Earths Around Low-Mass Stars*
Dec 11, 2017 Poster	American Geophysical Union Fall Meeting, New Orleans, LA *The Connection Between Solar Coronal Cavities and Solar Filaments*
Aug 9, 2017 Talk	Center for Astrophysics | Harvard & Smithsonian, Cambridge, MA *The Connection Between Solar Coronal Cavities and Solar Filaments*

Teaching and Work Experience

ASTRO 420W: Planets and Planetary System Formation — The Pennsylvania State University
Taught the online component of the course, graded writing assignments — *Fall 2020*

Exoplanets and the Search for Life Beyond Earth — PSU Upward Bound Virtual Summer Academy
Instructor — *Summer 2020*

ASTRO 414: Stellar Structure and Evolution — The Pennsylvania State University
Graded homework assignments — *Spring 2020*

ASTRO 402W: Astronomical Telescopes, Techniques, and Data Analysis — The Pennsylvania State University
Facilitated and evaluated student telescope use — *Spring 2020*

ASTRO 475W: Stars and Galaxies — The Pennsylvania State University
Facilitated in-class discussion, graded writing assignments — *Fall 2019*

ASTR 112: Fundamentals of Geology — Lycoming College
Laboratory Assistant — *Spring 2018*

ASTR 111: Fundamentals of Astronomy — Lycoming College
Laboratory Assistant — *Fall 2017*

Planetarium Operator — Lycoming College Detwiler Planetarium
Gave occasional public planetarium shows — *Spring 2017 - Spring 2018*

Academic Resource Center Tutor — Lycoming College
Provided walk-in tutoring services for most mathematics courses, with special hours for multivariable calculus and differential equations — *Fall 2016 - Spring 2018*

Outgassing Services International — Mountain View, CA
Intern, QCM thermogravimetric analysis testing and analysis of GC/MS data — *Summer 2016*

PHYS 226: Fundamentals of Physics II — Lycoming College
Laboratory Assistant — *Spring 2016, Spring 2017*

PHYS 225: Fundamentals of Physics I — Lycoming College
Laboratory Assistant — *Fall 2015, Fall 2016*

Outreach, Leadership, and Involvement

Wesleyan Star Gay-zing — Biannually 2023 - present
Co-organizer and volunteer — *Middletown, CT*

Kids Nights at Van Vleck Observatory — Fall 2023 - present
Volunteer — *Middletown, CT*

Space Nights at Van Vleck Observatory — October 2024
Speaker — *Middletown, CT*

Astronomy on Tap: State College — January 2021 - April 2023
Co-leader — *State College, PA*

Women and Underrepresented Genders in Astronomy (W+iA) — Fall 2018 - Spring 2023
Co-leader from Fall 2020 - Spring 2023 — *The Pennsylvania State University*

Towards A More Inclusive Astronomy (TaMIA) — Fall 2018 - Spring 2023
General member — *The Pennsylvania State University*

Society of Physics Students — Fall 2014 - May 2018
President in 2017, Vice-President in 2016 — *Lycoming College*

STEM Affinity Community — April 2017 - May 2018
President — *Lycoming College*

Association of Mathematically Interested Students (AMIS) — Fall 2014 - May 2018
General member, teacher at Math Awareness Day 2017 — *Lycoming College*

Honors, Awards, and Fellowships

Brinson Prize Postdoctoral Fellowship — 2023-present
Awarded to early-career astrophysicists to support innovative research. — *Wesleyan University*

Science Achievement Graduate Fellowship Nominee — 2022
For contributions to the advancement of women in sciences. — *The Pennsylvania State University*

Center For Exoplanets and Habitable Worlds Grant — 2022
Awarded to fund travel and participation at Exoplanets IV Conference. — *The Pennsylvania State University*

AAS International Travel Grant — 2020
Awarded to students presenting at international science meetings. — *The American Astronomical Society*

Center For Exoplanets and Habitable Worlds Grant — 2019
Awarded to fund travel and participation at TESS Science Conference. — *The Pennsylvania State University*

University Graduate Fellowship — 2018-2019
Awarded by the Eberly College of Science before the first year of graduate study. — *The Pennsylvania State University*

The Charles J. Kocian Award — May 2018
Awarded to the graduating senior with the highest GPA in the class. — *Lycoming College*

The Edward J. Gray Prize — May 2018
Awarded to the individuals with the highest or second highest GPA in the senior class. — *Lycoming College*

Φυσίκα Award in Astronomy & Physics — May 2018
Given to the graduating senior with the highest departmental GPA. — *Lycoming College*

Dean's List — Fall 2014-2017; Spring 2015-2018
Awarded for maintaining a GPA of at least 3.5. — *Lycoming College*

Kappa Mu Epsilon — Inducted March 2017
National math honor society — *Lycoming College*

Sigma Pi Sigma — Inducted March 2016
National physics honor society — *Lycoming College*

M.B. Rich Endowed Prize — April 2015
Awarded to freshmen who complete their first year with a 4.0 GPA. — *Lycoming College*

Fundamentals of Physics Award — April 2015
Awarded to the student who earns the highest grades in the introductory physics sequence. — *Lycoming College*

Principles of Astronomy Award — April 2015
Awarded to the student who earns the highest grade in introductory astronomy. — *Lycoming College*