Madisyn Brooks

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Education

Ph.D. Physics, University of Connecticut 2023 - 2028

B.S. Physics, University of Central Florida, Cum Laude 2019 - 2023

Research Experience

Intrinsic Properties of High Redshift Black Holes, University of Connecticut Fall 2024 - Present

- Conducting a census of intrinsic black hole populations using 2000+ galaxies from the CEERS, JADES, RUBIES, and GLASS JWST surveys
- Developed a novel forward modeling technique using Bayesian statistics to measure massive black holes in the early Universe
- **Skills:** Python, Bayesian Statistics, Forward Modeling, Statistical Analysis, Technical Writing

Dust Attenuation of Broad Line Active Galactic Nuclei in the JWST Deep Fields, University of Connecticut Fall 2023 - Fall 2024

- Published a detailed analysis of 25+ broad line active galactic nuclei using JWST NIRSpec spectroscopy to understand high redshift black holes
- Developed a Bayesian fitting algorithm for a dual-Gaussian emission line model
- **Skills:** Python, Bayesian Statistics, Technical Writing, Spectroscopic Analysis

Irregular Structure in Saturn's B-ring, University of Central Florida Spring 2020 - Spring 2023

- Analyzed stellar occultation data from NASA's Cassini Ultraviolet Imaging Spectrograph to study mesoscale structure in the core of Saturn's B-ring
- Discovered a population of ephemeral, azimuthal features in otherwise dense opaque regions of Saturn's B-ring
- **Skills:** IDL, Python, Poisson Statistics, Scientific Collaboration, Modeling Techniques

Pressure Smoothing of the Intergalactic Medium, University of California-Davis Summer 2022

- 10-week summer REU examining the Lyman alpha forest of a z = 2.92 lensed galaxy system by analyzing spectroscopic data from KCWI
- Demonstrated the ability to quantify pressure smoothing using a gravitationally lensed system and measured neutral hydrogen column densities using Python algorithms
- **Skills:** Python, Literature Review, Integrated Line Flux Measurement Techniques, Techincal Presentations

Dense Molecular Gas and Star Formation, National Radio Astronomy Observatory Summer 2021

- 12-week summer REU analyzing dense gas tracers from NRAO's Dense Extragalactic GBT+Argus Survey (DEGAS) to quantify the relationship between dense molecular gas and star formation in nearby galaxies
- Developed routine in Python to calculate integrated line flux measurements, explored barred vs unbarred galaxy trends
- **Skills:** Python, Linux, Radio Astronomy Fundamentals, Statistical Analysis

Awarded Grants, as Co-I

Cycle 4 JWST, GO-8410
A Census of Galaxy Kinematics and Outflows to $z \sim 7$
PI Raymond Simons

PUBLICATIONS, AS FIRST AUTHOR

Here There Be (Dusty) Monsters: High Redshift AGN are Dustier Than Their Hosts, **Brooks, M.**, et al., 2024, Submitted to ApJ

PUBLICATIONS, AS CO-AUTHOR

Emission-Line Diagnostics at $z > 4$: [OIII]λ4363/Hγ, Backhaus, B. et al., 2025, Submitted to ApJ

The Cosmic Evolution Early Release Science Survey (CEERS), Finkelstein, S. L, et al., 2024, Submitted to ApJ

Broad-Line AGN at $3.5 < z < 6$: The Black Hole Mass Function and a Connection with Little Red Dots, Taylor, A. J., et al., 2024, Submitted to ApJ

A Census from JWST of Extreme Emission Line Galaxies Spanning the Epoch of Reionization in CEERS, Davis, K., et al., 2023, ApJ in press

ORAL PRESENTATIONS

M. Brooks, R. Simons, J.R. Trump, "Dust Attenuation of BLAGN in the JWST Deep Fields," *University of Connecticut Astronomy Seminar Fall 2024*

M. Brooks, R. Simons, J.R. Trump, "Dust Attenuation of BLAGN in the JWST Deep Fields," *2024 Tinsley Workshop*

M. Brooks, D. Perlot, M. Guthrie, K. Davis, "The Restoration of the Cynthia Peterson Memorial Planetarium," *Middle Atlantic Planetarium Society (MAPS)* Conference 2024

M. Brooks, R. Simons, J.R. Trump, "Dust Attenuation of Little Red Dots," *CEERS Collaboration Meeting 2024*

J.E. Colwell, **M. Brooks**, R. Jerousek, C. Coleman, Matthew S Tiscareno, Klaus-Michael Aye, Mark Lewis, Larry W Esposito, "Irregular Structure in the Core of Saturn's B Ring," *American Geophysical Union 2021*

J.E. Colwell, **M. Brooks**, R. Jerousek, C. Coleman, "Phantoms in the Dark: Mesoscale Openings in the Core of Saturn's B Ring," *Europlanet Science Congress 2021*

POSTER PRESENTATIONS

M. Brooks, J.R. Trump, R. Simons, et al., "The Intrinsic Population of High Redshift AGN," *The Inaugural Cosmic Frontier Center Conference: The Formation of the Earliest Cosmic Structures from a Joint Observational and Theoretical Perspective*

M. Brooks, Tucker Jones, Keerthi Vasan G C, "Coherence Scale of the Intergalactic Medium from the Gravitational Lens System CSWA 38" *American Astronomical Society Winter 2023*

M. Brooks, Tucker Jones, Keerthi Vasan G C, "Investigating the Coherence Scale of the Intergalactic Medium" *2022 Physics Congress*

M. Brooks, Amanda Kepley, DEGAS Collaboration, "Star Formation in Dense Gas: the HCN-to-HCO+ Ratio" *American Astronomical Society Winter 2022*, Cancelled COVID-19

M. Brooks, "Investigating the Azimuthal Variance of Small-Scale Structure in Saturn's Rings," *UCF Student Scholar Symposium 2022*

M. Brooks, J. E. Colwell, R. Jerousek, "Phantoms in the Dark: Azimuthally and Radially Limited Regions of Translucence in Opaque Regions of Saturn's B Ring," *American Geophysical Union 2020*

TEACHING EXPERIENCE

Undergraduate Academic and Research Mentor, University of Connecticut

- Yarden Sackett (UConn BSc '25) Fall 2024 - Present

Guest Lecturer: Introductory Astronomy, University of Connecticut
- Seasons, 09/05/2024
- Moon Phases, 09/10/2024

Graduate Teaching Assistant, University of Connecticut
- Introductory Astronomy Laboratory, PHYS1025Q — Fall 2023, Fall 2024, Spring 2025
- General Physics II Laboratory, PHYS1202Q — Spring 2024

Physics Learning Assistant, University of Central Florida
- Theoretical Methods of Physics, PHZ3113 — Fall 2021
- Electricity & Magnetism I, PHY3223 — Spring 2021
- College Physics II, PHY2054 — Fall 2020

Awards and Honors

National Science Foundation Graduate Research Fellowship Honorable Mention — Spring 2025

National Fellowships Incentive Program Award — Spring 2024

National Science Foundation Graduate Research Fellowship Honorable Mention — Spring 2023

UCF College of Sciences General Scholarship — Spring 2023

Research and Mentoring Program (RAMP) Scholar — Fall 2021 - Spring 2023
- Research Supervisor: Dr. Joshua Colwell

Society of Physics Students Future Faces of Physics Award — Fall 2021, Fall 2022
- Project Lead Fall 2022

Society of Physics Students Marsh-White Award — Fall 2021, Fall 2022
- Project Lead Fall 2021

Society of Physics Students Chapter Research Award — Fall 2022 - Spring 2023

Society of Physics Students Travel Award — Fall 2022

PhysCon HBCU/MSI Travel Award — Fall 2022

Society of Physics Students Outstanding Chapter Award — Fall 2021 - Spring 2022

Sigma Pi Sigma Member — Spring 2022 - Spring 2023

UCF Pegasus Scholarship — Spring 2019

Florida Bright Futures Scholarship — Spring 2019

Service

AI Safety Group (BEACON), University of Connecticut — Fall 2024- Present
- Social Media Coordinator

Astronomy Seminar Committee, University of Connecticut — Spring 2024 - Present

Observatory Volunteer, University of Connecticut — Fall 2023 - Present

Planetarium Presenter, University of Connecticut — Fall 2023 - Present

Women in Physics Society, University of Central Florida — Fall 2020 - Spring 2023
- President Fall 2021 - Spring 2023, Secretary Spring 2021

CUWiP Local Organizing Committee, University of Central Florida — Fall 2022 - Spring 2023
- Undergraduate chair, advertising committee, fundraising committee

Society of Physics Students, University of Central Florida — Spring 2021 - Spring 2023
- Treasurer, Fall 2021 - Spring 2023

Undergraduate Life Committee, University of Central Florida — Spring 2021 - Spring 2023

STARBASE Central Florida Volunteer — Fall 2022 - Spring 2023