Lia Medeiros

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Positions

2025 – present **Assistant Professor, University of Wisconsin, Milwaukee**

2023 – 2024 **NASA Hubble Fellowship Program, Einstein Fellow, Princeton University**

2019 – 2023 **Member, Institute for Advanced Study**

2019 – 2022 **NSF Astronomy and Astrophysics Postdoctoral Fellow, Institute for Advanced Study**

Education

2019 **Ph.D. in Physics, University of California, Santa Barbara**
Thesis advisor: Feryal Özel

2016 **M.S. in Physics, University of California, Santa Barbara**

2013 **B.S. in Physics and Astrophysics, University of California, Berkeley**

Grants

I have been awarded $\sim$ \$1,300,000 in NSF and NASA funding so far.

2024 – present **NSF Astronomy and Astrophysics Grant (AAG)**, *University of Wisconsin, Milwaukee*, "Collaborative Research: Hunting for warped accretion disks and jets around supermassive black holes" \$382,000

2023 – 2024 **NASA Hubble Fellowship Program, Einstein Fellow (NHFP)**, *Princeton University*, over \$410,000

2019 – 2022 **NSF Astronomy and Astrophysics Postdoctoral Fellowship (AAPF)**, *Institute for Advanced Study*, \$300,000, plus \$50,000 supplement due to pandemic

2015 – 2018 **NSF Graduate Research Fellowship Program (GRFP)**, *UCSB; visiting scholar University of Arizona 3 years and Black Hole Initiative, Harvard 1 year*, $\sim$\$140,000

Awards

Individual

2022 **EHT Early Career Award**, for co-leading EHTC et al. 2022f

2022 **Nature Inspiring Women in Science, Scientific Achievement**, Judges Special Commendation

2021 **EHT Early Career Award**, for contributions to Psaltis, Medeiros, et al. 2020

2019 **Vote of Applause from Brazilian Senate**, for contribution to first picture of a black hole, required endorsement of 27 senators

2015 **Chair's Service Award, UCSB**, for work with Women in Physics (WiP)

Shared Among EHT Members

2021 **Royal Astronomical Society Citation for the Group Achievement Award**
2020 **AAS Bruno Rossi Prize**
2020 **Einstein Medal**
2020 **Breakthrough Prize in Physics**, $3,000,000 shared among collaboration
2019 **NSF Diamond Achievement Award**

Students Mentored

2025 – present **Isen Ries**, *University of Wisconsin, Milwaukee*
Advising undergraduate student, working on developing new educational materials and generating 3D rendering and visualizations of GRMHD simulations.

2025 – present **Luanna Quinalha**, *University of Wisconsin, Milwaukee*
Advising visiting undergraduate student from Barnard University, working on applying PCA to GRMHD fluid volumes to characterize and model variability.

2024 – present **Rohan Amanaganti**, *University of Wisconsin, Milwaukee*
Advising PhD thesis on modeling accretion onto supermassive black holes, and using these simulations to train machine learning algorithms for EHT data analysis.

2024 – present **Giovani Vicentin**, *Princeton University*
Co-mentoring visiting PhD student on thesis project calculating the reconnection rate in global GRMHD simulations of accreting supermassive black holes.

2023 – present **Juvis Mbeng**, *University of Georgia*
Co-advising PhD student on project to use my PRIMO algorithm on interferometric ALMA data for proto-planetary disks.

2023 **Tesla Holman**, *University of Wisconsin, Milwaukee*
Advised undergraduate research on decomposing simulated 3-D accretion flows with principal component analysis to characterize variability.

2021 – 2024 **Aniket Sharma**, *Indian Institute of Science Education and Research, Mohali*
Advised masters thesis on developing new radiative ray-tracing code (`Mahakala`) for simulating images of black hole accretion flows around arbitrary metrics. Visited IAS Sept. – Nov. 2022 (NSF AAPF funded), defended Spring 2023.

2020 – present **Pravita Hallur**, *Indian Institute of Science Education and Research, Mohali*
Advised undergraduate research on PCA algorithm and masters thesis on characterising variability of simulated accretion flows and developing a parametric variability model. Visited IAS July – Sept. 2022 (NSF AAPF funded), defended Spring 2023.

2021 **Carlos Ortiz-Quintana**, *Princeton Undergraduate Summer Research Program, National Astronomy Consortium, University of Puerto Rico, Mayagüez*
Advised summer research project on PCA of polarized simulated images.

2021 **Rachel Wells**, *University of Arizona, Tucson, AZ*
Co-advised undergraduate honors project for education program.

Selected Service

2024 **SOC Testing Gravity Conference**, Vancouver, Canada, Jan. 2024

2023 **SOC and LOC Advancing EHT at IAS**, Institute for Advanced Study, Nov. 2023

2023 **SOC EHT collaboration meeting**, Taipei, Taiwan, June 2023

2022 – 2023 **Organizer IAS/PU Joint Colloquium Series**

2023 **SOC "Improving BH Accretion Models with Plasma Theory"**, Princeton Center for Theoretical Sciences, Feb. 2023

2022 – 2023 **Member Junior Scientist Council**, *EHT*
Participated in EHT Science Council, organized first "EHT Welcome Day" to introduce new new members to the collaboration, represented junior EHT members.

2019 – 2022 **Gravitational Physics Working Group Co-Coordinator**, *EHT*
Coordinated EHT efforts to test fundamental physics, coordinated with other EHT WGs for main EHT results, advised collaboration on observing and analysis strategies to provide sharper tests of general relativity, contributed to EHT proposals, managed related projects, coordinated Sgr A* testing gravity collaboration paper.

2021 **SOC EHT collaboration meeting**, virtual conference, June 2021

2021 **SOC "Polarized radiation near supermassive black holes"**, virtual, Princeton Center for Theoretical Sciences, May 2021

2020 **LOC EHT collaboration meeting**, virtual conference, Dec. 2020

2018 – 2019 **PIRE education committee**, *University of Arizona*
Graduate student representative for NSF's BH Partnerships in International Research and Education (PIRE), planned yearly summer schools and a webinar series.

2019 **SOC EHT collaboration meeting**, Hilo, HI, Dec. 2019

Reviewer for Astrophysical Journal, Physical Review, as well as NASA and NSF fellowships/grants

First author, student-led papers from my group, and co-led papers

64 total papers, 41 listed below, * denotes student-led papers from my group

11. *"Black hole mimickers: from theory to observation"*; Workshop Proceedings, chapter "EHT Tests of Gravity: What we've learned so far and what's to come"; **Medeiros, Lia**; arXiv:2505.09014
10. * *"`Mahakala`: a Python-based Modular Ray-tracing and Radiative Transfer Algorithm"*; Sharma, Aniket; **Medeiros, Lia**; Wong, George; et al.; 2025 ApJ 985:40
9. *"High-Resolution EHT Image Reconstruction of the Black Hole in M87 with `PRIMO`"*
Medeiros, Lia; Psaltis, Dimitrios; Lauer, Tod; Özel, Feryal; 2023 ApJ 947:L7
8. *"Principal-Component Interferometric Modeling (`PRIMO`), an Algorithm for EHT Data I: Reconstructing Images from Simulated EHT Observations"*
Medeiros, Lia; Psaltis, Dimitrios; Lauer, Tod; Özel, Feryal; 2023 ApJ, 943:144
7. *"First Sagittarius A* Event Horizon Telescope Results. VI. Testing the Black Hole Metric"*
EHTC including **Medeiros, Lia, I co-led this paper**; 2022 ApJL, 930:L17

6. * *"A Red-Noise Eigenbasis for the Reconstruction of Blobby Images"*
Hallur, Pravita; **Medeiros, Lia**; Lauer, Tod R.; 2022, ApJ, 927:111
5. *"Brightness Asymmetry of Black Hole Images as a Probe of Observer Inclination"*
Medeiros, Lia; Chan, Chi-Kwan; Narayan, Ramesh; et al.; 2022 ApJ, 924:46
4. *"A Parametric model for the shapes of black-hole shadows in non-Kerr spacetimes"*
Medeiros, Lia; Psaltis, Dimitrios; Özel, Feryal; 2020 ApJ, 896:7
3. *"Principal Component Analysis as a Tool for Characterizing Black Hole Images and Variability"*
Medeiros, Lia; Lauer, Tod R.; Psaltis, Dimitrios; Özel, Feryal; 2018 ApJ, 864:7
2. *"GRMHD Simulations of Visibility Amplitude and Phase Variability for Event Horizon Telescope Images of Sgr A*"*
Medeiros, Lia; Chan, Chi-kwan; Özel, Feryal; et al.; 2018 ApJ, 856:163
1. *"Variability in GRMHD Simulations of Sgr A*: Implications for EHT Closure Phase Observations"*
Medeiros, Lia; Chan, Chi-kwan; Özel, Feryal; et al.; 2017 ApJ, 844:35

Co-author papers I contributed to:

14. *"Measuring Black Hole Light Echoes with Very Long Baseline Interferometry"*;
Wong, George N.; **Medeiros, Lia**; Cárdenas-Avendaño, Alejandro; Stone, James 2024 ApJL, 975:L40
13. *"Theoretical Foundation of Black Hole Image Reconstruction using PRIMO"*; Psaltis, Dimitrios; Özel, Feryal; **Medeiros, Lia**; et al.; 2024 ApJ, 984:86
12. *"First Sagittarius A* Event Horizon Telescope Results. V. Testing Astrophysical Models of the Galactic Center Black Hole"*;
EHTC including **Medeiros, Lia**; 2022 ApJL, 930:L16
11. *"First Sagittarius A* Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way"*;
EHTC including **Medeiros, Lia**; 2022 ApJL, 930:L12
10. *"Markov Chains for Horizons (MARCH). I. Identifying Biases in Fitting Theoretical Models to Event Horizon Telescope Observations"*
Psaltis, Dimitrios; Özel, Feryal; **Medeiros, Lia**; et al.; 2022 ApJ, 928:55,
9. *"The variability of the black-hole image in M87 at the dynamical timescale"*
Satapathy, Kaushik; Psaltis, Dimitrios; Özel, Feryal; **Medeiros, Lia**; et al.; 2022, ApJ, 925:13
8. *"Gravitational Test beyond the First Post-Newtonian Order with the Shadow of the M87 Black Hole"*
Psaltis, Dimitrios; **Medeiros, Lia**; Christian, Pierre; Özel, Feryal; The Event Horizon Telescope Collaboration; 2020 PRL, 125:1104
7. *"Discretization and Filtering Effects on Black Hole Images Obtained with the Event Horizon Telescope"*
Psaltis, Dimitrios; **Medeiros, Lia**; Lauer, Tod R.; et al.; 2020 submitted to ApJ, arXiv:2004.06210
6. *"First M87 Event Horizon Telescope Results. IV. Imaging the Central Supermassive Black Hole"*; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L4

5. *"GRay2: A General Purpose Geodesic Integrator for Kerr Spacetime"*
Chan, Chi-kwan; **Medeiros, Lia**; Özel, Feryal; Psaltis, Dimitrios; 2018 ApJ, 867:59
4. *"A Model for Anisotropic Interstellar Scattering and its Application to Sgr A*"*
Psaltis, Dimitrios; Johnson, Michael; Narayan, Ramesh; **Medeiros, Lia**; et al.; 2018 submitted to ApJ, arXiv:1805.01242
3. *"Bayesian Techniques for Comparing Time-dependent GRMHD Simulations to Variable Event Horizon Telescope Observations"*
Kim, Junhan; Marrone, Daniel P.; Chan, Chi-Kwan; **Medeiros, Lia**; et al.; 2016 ApJ, 832:156
2. *"Fast Variability and mm/IR flares in GRMHD Models of Sgr A* from Strong-Field Gravitational Lensing"*
Chan, Chi-Kwan; Psaltis, Dimitrios; Özel, Feryal; **Medeiros, Lia**; et al.; 2015 ApJ, 812:103
1. *"Abundant cyanopolyynes as a probe of infall in the Serpens South cluster-forming region"*
Friesen, Rachel; **Medeiros, Lia**; Schnee, Scott; et al.; 2013 MNRAS, 436, 1513–1529

Primary EHT collaboration papers I contributed to as collaboration member

16. *"First Sagittarius A* Event Horizon Telescope Results. VIII. Physical Interpretation of the Polarized Ring"*; EHTC including **Medeiros, Lia**; 2024 ApJL, 964:L26
15. *"First Sagittarius A* Event Horizon Telescope Results. VII. Polarization of the Ring"*; EHTC including **Medeiros, Lia**; 2024 ApJL, 964:L25
14. *"The persistent shadow of the supermassive black hole of M 87. I. Observations, calibration, imaging, and analysis"*; EHTC including **Medeiros, Lia**; 2024 A&A, 681:79
13. *"First M87 Event Horizon Telescope Results. IX. Detection of Near-horizon Circular Polarization"*; EHTC including **Medeiros, Lia**; 2023 ApJL, 957:L20
12. *"First Sagittarius A* Event Horizon Telescope Results. IV. Variability, Morphology, and Black Hole Mass"*; EHTC including **Medeiros, Lia**; 2022 ApJL, 930:L15
11. *"First Sagittarius A* Event Horizon Telescope Results. III. Imaging of the Galactic Center Supermassive Black Hole"*; EHTC including **Medeiros, Lia**; 2022 ApJL, 930:L14
10. *"First Sagittarius A* Event Horizon Telescope Results. II. EHT and Multiwavelength Observations, Data Processing, and Calibration"*; EHTC including **Medeiros, Lia**; 2022 ApJL, 930:L13
9. *"Broadband Multi-wavelength Properties of M87 during the 2017 Event Horizon Telescope Campaign"*; EHT MWL Science Working Group including **Medeiros, Lia**; 2021 ApJL, 911:L11
8. *"First M87 Event Horizon Telescope Results. VIII. Magnetic Field Structure near The Event Horizon"*; EHTC including **Medeiros, Lia**; 2021 ApJL, 910:13
7. *"First M87 Event Horizon Telescope Results. VII. Polarization of the Ring"*; EHTC including **Medeiros, Lia**; 2021 ApJL, 910:12
6. *"First M87 Event Horizon Telescope Results. VI. The Shadow and Mass of the Central Black Hole"*; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L6,
5. *"First M87 Event Horizon Telescope Results. V. Physical Origin of the Asymmetric Ring"*; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L5
4. *"First M87 Event Horizon Telescope Results. IV. Imaging the Central Supermassive Black Hole"*; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L4

3. *"First M87 Event Horizon Telescope Results. III. Data Processing and Calibration"*; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L3
2. *"First M87 Event Horizon Telescope Results. II. Array and Instrumentation"*; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L2
1. *"First M87 Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole"*; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L1