

LIA MEDEIROS

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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 received over \$900,000 in NSF and NASA funding so far.

- 2023–2026 **NASA Hubble Fellowship, Einstein Fellow, 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*, ~\$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 Within EHT

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

Outreach, Equity, Diversity, and Inclusion Efforts

- 2019–present **Astronomy Curriculum for middle/high school, Princeton School District**
NSF AAPF education project. Developed and taught astronomy focused curriculum to low-income students. Included teaching part of the high school science course for students who are recent refugees from Guatemala (two semesters).

- 2019 **Outreach project with NSF’s BH PIRE**, *Institute for Advanced Study*
Developed high school curriculum for course on gravity, including lecture given by Prof. Psaltis and myself, broadcast to hundreds of classrooms.
- 2015 – 2019 **Independent outreach initiative**, *UCSB/University of Arizona*
Planned and led outreach project to give conceptual presentations of exciting physics topics to high school students. Involved other graduate students in project.
- 2013 – 2015 **Women in Physics Committee (WiP)**, *UCSB*
Co-chair 2014-2015, organized extra visit day for prospective female graduate students, which increased female representation in the department.

Students Mentored

- 2023 – present **Tesla Holman**, *University of Wisconsin, Milwaukee*
Advised undergraduate research on decomposing simulated 3-D accretion flows with principal component analysis to characterize variability.
- 2021 – present **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

- 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.
- 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.

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

53 total papers, 32 listed below, * denotes student-led papers from my group

10. * *“Mahakala: a Python-based Modular Ray-tracing and Radiative Transfer Algorithm”*
Sharma, Aniket; **Medeiros, Lia**; Chan, Chi-Kwan, et al.; 2023 to be submitted arXiv:2304.03804
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 significantly

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 Tele-

- scope 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

10. “First Sagittarius A* Event Horizon Telescope Results. IV. Variability, Morphology, and Black Hole Mass”; EHTC including **Medeiros, Lia**; 2022 ApJL, 930:L15
9. “First Sagittarius A* Event Horizon Telescope Results. III. Imaging of the Galactic Center Supermassive Black Hole”; EHTC including **Medeiros, Lia**; 2022 ApJL, 930:L14
8. “First Sagittarius A* Event Horizon Telescope Results. II. EHT and Multiwavelength Observations, Data Processing, and Calibration”; EHTC including **Medeiros, Lia**; 2022 ApJL, 930:L13
7. “First M87 Event Horizon Telescope Results. VIII. Magnetic Field Structure near The Event Horizon”; EHTC including **Medeiros, Lia**; 2021 ApJL, 910:13
6. “First M87 Event Horizon Telescope Results. VII. Polarization of the Ring”; EHTC including **Medeiros, Lia**; 2021 ApJL, 910:12
5. “First M87 Event Horizon Telescope Results. VI. The Shadow and Mass of the Central Black Hole”; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L6,
4. “First M87 Event Horizon Telescope Results. V. Physical Origin of the Asymmetric Ring”; EHTC including **Medeiros, Lia**; 2019 ApJL, 875:L5
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