Abhishek V. Joshi

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241 Loomis Laboratory, 1110 W Green St, Urbana, Illinois

Education

PhD, Physics, University of Illinois Urbana-Champaign — 2019–present
Advisor: Professor Charles Gammie — GPA: 3.9/4.0

BS, Engineering Physics, University of Illinois Urbana-Champaign — 2015–2018
Summa Cum Laude, Computer Science Minor — GPA: 3.83/4.0

Research Interests

Supermassive black hole accretion, general relativistic radiative transfer (GRRT), general relativistic magnetohydrodynamics (GRMHD), numerical relativity, astrophysical plasmas, High-Performance Computing (HPC), High-Throughput Computing (HTC)

Work Experience

Graduate Research Assistant Intern, Los Alamos National Lab — 2025

Graduate Research Assistant, UIUC — 2020–2024

Graduate Teaching Assistant, UIUC — 2019–2020, Fall 2022, Fall 2024, Spring 2025

Software Intern at Thermo Fisher Scientific San Jose, CA — Summer 2019
Developed methods for real-time optimization of ion source inlet sprays for mass spectrometers (Patent US11791144B2).

Research Experience

Radiative Transfer methods

Developed and maintained deterministic and Monte Carlo radiative transfer codes in the AFD-Illinois group.
Experience with polarized modeling, circular polarization in particular.
Generated large libraries of simulated black hole images and applied statistical methods for model inference with observations for both individual and Event Horizon Telescope collaboration (EHT) projects.

General Relativistic Magnetohydrodynamics

Generated and analyzed simulations of accretion flows. Computed emission proxies and jet power statistics for model inference.

Numerical Relativity

Generated simulations of eccentric spin-aligned binary black holes using the Einstein Toolkit. Compared numerical waveforms to template library waveforms to investigate effects of high-order modes.

Awards and Honors

Mavis Future Faculty Fellowship — 2025–2026
Scott Anderson Outstanding Graduate Assstant Award — Spring 2025
University Fellowship Award for Research Accomplishments — Fall 2023

Gregory, J.M & L.C. scholarship 2017–2018
UIUC James Scholar Honors 2016–2018

Selected Publications

Lists: NASA ADS, Google Scholar, ORCID. 1304 citations, 2 first-author

11. Event Horizon Telescope Collaboration, , Akiyama, K., Albentosa-Ruíz, E., et al., incl. **Joshi, A. V.** 2025, A&A, 693, A265
The persistent shadow of the supermassive black hole of M87: II. Model comparisons and theoretical interpretations

10. **Joshi, A. V.**, Prather, B. S., Chan, C., Wielgus, M., et al. 2024, ApJ, 972, 135
Circular Polarization of Simulated Images of Black Holes

9. Event Horizon Telescope Collaboration, , Akiyama, K., Alberdi, A., et al., incl. **Joshi, A. V.** 2024, ApJL, 964, L26
First Sagittarius A Event Horizon Telescope Results. VIII. Physical Interpretation of the Polarized Ring*

8. Event Horizon Telescope Collaboration, , Akiyama, K., Alberdi, A., et al., incl. **Joshi, A. V.** 2023, ApJL, 957, L20
First M87 Event Horizon Telescope Results. IX. Detection of Near-horizon Circular Polarization

7. Conroy, N. S., Bauböck, M., Dhruv, V., et al., incl. **Joshi, A. V.** 2023, ApJ, 951, 46
Rotation in Event Horizon Telescope Movies

6. **Joshi, A. V.**, Rosofsky, S. G., Haas, R., & Huerta, E. A. 2023, PhRvD, 107, 064038
Numerical relativity higher order gravitational waveforms of eccentric, spinning, nonprecessing binary black hole mergers

5. Event Horizon Telescope Collaboration, , Akiyama, K., Alberdi, A., et al., incl. **Joshi, A. V.** 2022, ApJL, 930, L16
First Sagittarius A Event Horizon Telescope Results. V. Testing Astrophysical Models of the Galactic Center Black Hole*

4. Event Horizon Telescope Collaboration, , Akiyama, K., Alberdi, A., et al., incl. **Joshi, A. V.** 2022, ApJL, 930, L12
First Sagittarius A Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way*

3. Wong, G. N., Prather, B. S., Dhruv, V., et al., incl. **Joshi, A. V.** 2022, ApJS, 259, 64
PATOKA: Simulating Electromagnetic Observables of Black Hole Accretion

2. Marszewski, A., Prather, B. S., **Joshi, A. V.**, Pandya, A., et al. 2021, ApJ, 921, 17
Updated Transfer Coefficients for Magnetized Plasmas

1. Pandya, A., Chandra, M., **Joshi, A. V.**, & Gammie, C. F. 2018, ApJ, 868, 13
Numerical Evaluation of the Relativistic Magnetized Plasma Susceptibility Tensor and Faraday Rotation Coefficients

Mentoring

Illinois Guidance for Physics Students (GPS) 2023–present

Mentored three undergraduate students about physics research, grad school applications and general academic guidance.

Computational Astrophysics Group Mentoring 2021–present
Mentored four undergraduate students on their own projects within Charles Gammie's research group.

UIUC Young Scholars Program Summer 2018
Mentored a high school student over the summer on a simulation visualization project.

Teaching

Teaching Assistant, University of Illinois Urbana-Champaign

PHYS 598, Computational Physics and Astrophysics Fall 2022, Fall 2024

PHYS 214, University Physics: Quantum Physics Summer 2020

PHYS 212, University Physics: Electricity & Magnetism Spring 2020
Ranked excellent teacher by students.

PHYS 102, College Physics: E&M and Modern Physics Fall 2019, Spring 2025
Ranked excellent teacher by students.

Outreach and Volunteering

Education Justice Project (EJP), Writing and Math Program Tutor 2023–present
Tutored students enrolled within the EJP initiative at the Danville Correctional Center in math, writing and general black hole astrophysics concepts.

Speaker, Satkama High School, Hyderabad, India Jan 2024
Engaged with students from 6th to 10th grades by presenting concepts of horizon-scale black hole astrophysics with demos and animations.

Lab Presenter, Conference for Undergraduate Women in Physics (CUWiP) Jan 2023
Gave a talk to participants of the conference about Charles Gammie's research group activities and EHT science.

Black hole science demo, University Primary School May 2022
Interacted with students from 2nd to 5th grades about black holes and EHT science. Coordinated an outdoor activity for the students.

Press

CHTC, "Junior Researchers Advance Black Hole Research with OSPool Open Capacity," April 29, 2024, https://chtc.cs.wisc.edu/eht-story.html.

Grainger Engineering Office of Marketing and Communications, "A Supermassive Black Hole's Strong Magnetic Fields Are Revealed in a New Light," https://icasu.illinois.edu/news/EHT-2023.

Grainger Engineering Office of Marketing and Communications, "Gammie Group at Illinois Physics Contributes to First-Ever Image of Supermassive Black Hole at Milky Way's Galactic Center," https://physics.illinois.edu/news/EHT-Images_Sag-A-Star.