George N. Wong: Curriculum Vitae

Institute for Advanced Study
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Research Overview

I am an astrophysicist with broad interests that are often related in some way to black holes and plasma physics. I have studied models of accretion onto supermassive black holes and the connection between black holes and relativistic jets, especially in the context of observation. I employ both computational simulation and analytic calculation in my work.

Appointments

Institute for Advanced Study (School of Natural Sciences)

Frank and Peggy Taplin Member	September 2022 – present
Postdoctoral Member	September 2021 – present

Princeton University

Associate Research Scholar (Gravity Initiative)	September 2021 – present

Los Alamos National Laboratory

Graduate Research Fellow (CCS-2)	September 2019 – December 2019

New York University

Adjunct Instructor (Undergraduate Physics & CS)	September 2015 – May 2016

Education

University of Illinois Urbana–Champaign

Ph.D. in Physics under the supervision of Charles F. Gammie	August 2021
M.S. in Physics	August 2019

New York University

B.A.'s in Physics with honors and Computer Science and Mathematics	May 2015

Research History

Computational and theoretical astrophysics

Center for Theoretical Astrophysics (Illinois) 2016 – 2021

Numerical and analytic models of black hole accretion, relativistic polarized radiative transfer, pair production, and jet population mechanisms.

CCS-2 (Los Alamos National Lab) 2019

Development and testing of Monte Carlo radiation codes, numerical simulation of radiatively inefficient accretion flows.

Center for Cosmology and Particle Physics (NYU) 2014 – 2016

Extending models of relativistic jets into the analytic regime, radiative transfer afterglow calculation, and statistical (Bayesian) analysis of Swift afterglow mission observations.

Computational epidemiology

University of Illinois 2020 – 2021

Modeling COVID-19 for the Illinois governor's office using heterogeneous, non-Markovian age-of-infection models, and analysis of contact tracing using agent-based models.

5G wireless technologies

NYU WIRELESS 2012 – 2015

Development of MIMO channel models for 5G communications, algorithm design for voltage phase triggering, channel sounder design/operation, and circuit and systems design.

Selected Honors & Awards

National Academy of Sciences Kavli Fellow	2022
Event Horizon Telescope "Outstanding Ph.D. in Theory" Award	2021
Letter of Commendation from University of Illinois for COVID-19 Modeling	2021
Donald C. & F. Shirley Jones Fellowship	2020
Illinois Physics Department Excellence Award	2020
Breakthrough Prize in Fundamental Physics, Albert Einstein Medal, Bruno Rossi Prize, Nelson P. Jackson Aerospace Award (as a member of the EHT)	2020
Samuel F. B. Morse Medal for Excellence in Physics	2015
George Granger Brown Scholarship in Physics	2015
IEEE Donald G. Fink Award	2015
Louis Baron Scholarship in Mathematics	2013 – 2015
Julius Silver Scholarship	2011

Refereed Publications

59. R. Qiu, A. Ricarte, R. Narayan, **G. N. Wong**, et al., "Using Machine Learning to link black hole accretion flows with spatially resolved polarimetric observables," MNRAS, 520, 4867Q, 2023, 10.1093/mnras/stad466
58. S. Jorstad, M. Wielgus, R. Lico, S. Issaoun, et al., "The Event Horizon Telescope Image of the Quasar NRAO 530," ApJ, 943, 170J, 2023, 10.3847/1538-4357/acaea8
57. R. Emami, R. Anantua, A. Ricarte, S. Doeleman, et al., "Probing Plasma Composition with the Next Generation Event Horizon Telescope (ngEHT)," Galaxies, 11, 11E, 2023, 10.3390/galaxies11010011
56. R. Anantua, J. Dúran, N. Ngata, L. Oramas, et al., "Emission Modeling in the EHTâĂŞngEHT Age," Galaxies, 11, 4A, 2023, 10.3390/galaxies11010004
55. **G. N. Wong**, C. F. Gammie, "Effects of Hydrogen vs. Helium on Electromagnetic Black Hole Observables," ApJ, 937, 60W, 2022, 10.3847/1538-4357/ac854d
54. S. Issaoun, M. Wielgus, S. Jorstad, T. P. Krichbaum, et al., "Resolving the Inner Parsec of the Blazar J1924-2914 with the Event Horizon Telescope," ApJ, 934, 145I, 2022, 10.3847/1538-4357/ac7a40
53. D–R. E. Ranoa, R. L. Holland, F. G. Alnaji, K. J. Green, et al., "Mitigation of SARS-CoV-2 transmission at a large public university," Nat Commun., 13(1):3207, 2022, 10.1038/s41467-022-30833-3
52. A. E. Broderick, R. Gold, B. Georgiev, D. W. Pesce, et al., "Characterizing and Mitigating Intraday Variability: Reconstructing Source Structure in Accreting Black Holes with mm-VLBI," ApJ, 930L, 21B, 2022, 10.3847/2041-8213/ac6584
51. B. Georgiev, D. W. Pesce, A. E. Broderick, **G. N. Wong**, et al., "A Universal Power-law Prescription for Variability from Synthetic Images of Black Hole Accretion Flows," ApJ, 930L, 20G, 2022 10.3847/2041-8213/ac65eb
50. M. Wielgus, N. Marchili, I. Martí-Vidal, G. K. Keating, et al., "Millimeter Light Curves of Sagittarius A* Observed during the 2017 Event Horizon Telescope Campaign," ApJ, 930L, 19W, 2022, 10.3847/2041-8213/ac6428
49. J. Farah, P. Galison, K. Akiyama, K. L. Bouman, et al., "Selective Dynamical Imaging of Interferometric Data," ApJ, 930L, 18F, 2022, 10.3847/2041-8213/ac6615
48. The Event Horizon Telescope Collaboration, et al., "First Sagittarius A* Event Horizon Telescope Results. VI. Testing the Black Hole Metric," ApJ, 930L, 17A, 2022, 10.3847/2041-8213/ac6756
47. The Event Horizon Telescope Collaboration, et al., "First Sagittarius A* Event Horizon Telescope Results. V. Testing Astrophysical Models of the Galactic Center Black Hole," ApJ, 930L, 16A, 2022, 10.3847/2041-8213/ac6672
46. The Event Horizon Telescope Collaboration, et al., "First Sagittarius A* Event Horizon Telescope Results. IV. Variability, Morphology, and Black Hole Mass," ApJ, 930L, 15A, 2022, 10.3847/2041-8213/ac6736
45. The Event Horizon Telescope Collaboration, et al., "First Sagittarius A* Event Horizon Telescope Results. III. Imaging of the Galactic Center Supermassive Black Hole," ApJ, 930L, 14A, 2022, 10.3847/2041-8213/ac6429
44. The Event Horizon Telescope Collaboration, et al., "First Sagittarius A* Event Horizon Telescope Results. II. EHT and Multiwavelength Observations, Data Processing, and Calibration," ApJ, 930L, 13A, 2022, 10.3847/2041-8213/ac6675
43. The Event Horizon Telescope Collaboration, et al., "First Sagittarius A* Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way," ApJ, 930L, 12A, 2022, 10.3847/2041-8213/ac6674
42. **G. N. Wong**, B. S. Prather, V. Dhruv, B. R. Ryan, et al., "PATOKA: Simulating Electromagnetic Observables of Black Hole Accretion," ApJS, 259, 64W, 2022, 10.3847/1538-4365/ac582e
41. D. C. M. Palumbo, **G. N. Wong**, "Photon Ring Symmetries in Simulated Linear Polarization Images of Messier 87*," ApJ, 929, 49P, 2022, 10.3847/1538-4357/ac59b4

40. K. Satapathy, D. Psaltis, F. Özel, L. Medeiros, et al., "The Variability of the Black Hole Image in M87 at the Dynamical Timescale," ApJ, 925, 13, 2022, 10.3847/1538-4357/ac332e

39. P. Z. Yao, J. Dexter, A. Y. Chen, B. R. Ryan, et al., "Radiation GRMHD Simulations of M87: Funnel properties and prospects for gap acceleration," MNRAS, 507, 4864Y, 2021, 10.1093/mnras/stab2462

38. B. S. Prather, **G. N. Wong**, V. Dhruv, B. R. Ryan, et al., "iharm3D: Vectorized General Relativistic Magnetohydrodynamics," JOSS, 6.3336P, 2021, 10.21105/joss.03336

37. A. V. Tkachenko, S. Maslov, T. Wang, A. Elbana, et al., "Stochastic social behavior coupled to COVID-19 dynamics leads to waves, plateaus, and an endemic state," eLife, 10, e68341, 2021, 10.7554/eLife.68341

36. M. Janssen, H. Falcke, M. Kadler, E. Ros, et al., "Event Horizon Telescope observations of the jet launching and collimation in Centaurus A," NatAs, 139J, 2021, 10.1038/s41550-021-01417-w

35. **G. N. Wong**, Y. Du, B. S. Prather, C. F. Gammie, "The Jet–Disk Boundary Layer in Black Hole Accretion," ApJ, 914, 55W, 2021, 10.3847/1538-4357/abf8b8

34. P. Kocherlakota, L. Rezolla, H. Falcke, C. M. Fromm, et al., "Constraints on Black Hole Charges with the 2017 EHT Observations of M87*," PRD, 103, 104047, 2021, 10.1103/PhysRevD.103.104047

33. S. Hadar, M. D. Johnson, A. Lupsasca, **G. N. Wong**, "Photon Ring Autocorrelations," PRD, 103, 104038, 2021, 10.1103/PhysRevD.103.104038

32. Z. Gelles, B. S. Prather, D. C. M. Palumbo, M. D. Johnson, et al., "The Role of Adaptive Ray Tracing in Analyzing Black Hole Structure," ApJ, 912, 39G, 2021, 10.3847/1538-4357/abee13

31. R. Narayan, D. C. M. Palumbo, M. D. Johnson, Z. Gelles, et al., "'The Polarized Image of a Synchrotron-emitting Ring of Gas Orbiting a Black Hole," ApJ, 912, 35N, 2021, 10.3847/1538-4357/abf117

30. A. V. Tkachenko, S. Maslov, A. Elbanna, **G. N. Wong**, et al., "Time-dependent heterogeneity leads to transient suppression of the COVID-19 epidemic, not herd immunity," PNAS, 118, 17, 2021, 10.1073/pnas.2015972118

29. EHT MWL Science Working Group, J. C. Algaba, J. Anczarski, K. Asada, et al., "Broadband Multi-wavelength Properties of M87 during the 2017 Event Horizon Telescope Campaign," ApJL, 911L, 11E, 2021, 10.3847/2041-8213/abef71

28. The Event Horizon Telescope Collaboration, et al., "First M87 Event Horizon Telescope Results. VIII. Magnetic Field Structure near The Event Horizon," ApJL, 910L, 13E, 2021, 10.3847/2041-8213/abe4de

27. The Event Horizon Telescope Collaboration, et al., "First M87 Event Horizon Telescope Results. VII. Polarization of the Ring," ApJL, 910L, 12E, 2021, 10.3847/2041-8213/abe71d

26. C. Goddi, I. Martí–Vidal, H. Messias, G. Bower, et al., "Polarimetric Properties of Event Horizon Telescope Targets from ALMA," ApJL, 910L, 14G, 2021, 10.3847/2041-8213/abee6a

25. **G. N. Wong**, "Black Hole Glimmer Signatures of Mass, Spin, and Inclination," ApJ, 909, 217W, 2021, 10.3847/1538-4357/abdd2d

24. **G. N. Wong**, B. R. Ryan, C. F. Gammie, "Pair Drizzle around Sub-Eddington Supermassive Black Holes," ApJ, 907, 73W, 2021, 10.3847/1538-4357/abd0f9

23. A. Ricarte, B. S. Prather, **G. N. Wong**, R. Narayan, et al., "Decomposing the Internal Faraday Rotation of Black Hole Accretion Flows," MNRAS, 498, 5468R, 2020, 10.1093/mnras/staa2692

22. **G. N. Wong**, Z. J. Weiner, A. V. Tkachenko, A. Elbanna, et al., "Modeling COVID-19 dynamics in Illinois under non-pharmaceutical interventions," PRX, 10, 041033, 2020, 10.1103/PhysRevX.10.041033

21. D. Psaltis, L. Medeiros, P. Christian, F. Özel, et al., "A Gravitational Test at the Second Post-Newtonian Order with the Shadow of the M87 Black Hole," PRL, 125, 141104, 2020, 10.1103/PhysRevLett.125.141104

20. M. Wielgus, K. Akiyama, L. Blackburn, C. K. Chan, et al., "Monitoring the Morphology of M87* in 2009–2017 with the Event Horizon Telescope," ApJ, 901, 67W, 2020, 10.3847/1538-4357/abac0d

19. J.-Y. Kim, T. P. Krichbaum, A. E. Broderick, M. Wielgus, et al., "Event Horizon Telescope imaging of the archetypal blazar 3C 279 at an extreme 20 microarcsecond resolution," A&A, 640A, 69K, 2020, 10.1051/0004-6361/202037493

18. J. Yao-Yu Lin, **G. N. Wong**, B. S. Prather, C. F. Gammie, "Feature Extraction on Synthetic Black Hole Images," ML Interpretability for Scientific Discovery Workshop, ICML, 2020, 10.48550/arXiv.2007.00794

17. R. Yarza, **G. N. Wong**, B. R. Ryan, C. F. Gammie, "Bremsstrahlung in GRRMHD simulations of low accretion rate black holes," ApJ, 898, 50Y, 2020, 10.3847/1538-4357/ab9808

16. R. Gold, A. Broderick, Z. Younsi, C. Fromm, et al., "Verification of Radiative Transfer Schemes for the EHT," ApJ, 897, 148G, 2020, 10.3847/1538-4357/ab96c6

15. A. Broderick, R. Gold, M. Karami, J. Preciado-López, et al., "THEMIS: A Parameter Estimation Framework for the Event Horizon Telescope," ApJ, 897, 139B, 2020, 10.3847/1538-4357/ab91a4

14. D. C. M. Palumbo, **G. N. Wong**, B. S. Prather, "Discriminating Accretion States via Rotational Symmetry in Simulated Polarimetric Images of M87," ApJ, 894, 156P, 2020, 10.3847/1538-4357/ab86ac

13. F. Roelofs, M. Janssen, I. Natarajan, R. Deane, et al., "SYMBA: An end-to-end VLBI synthetic data generation pipeline. Simulating Event Horizon Telescope observations of M87," A&A, 636A, 5R, 2020, 10.1051/0004-6361/201936622

12. M. D. Johnson, A. Lupsasca, A. Strominger, **G. N. Wong**, et al., "Universal Interferometric Signatures of a Black Hole's Photon Ring," Science Advances, Vol. 6, no. 12, 2020, 10.1126/sciadv.aaz1310

11. O. Porth, K. Chatterjee, R. Narayan, C. F. Gammie, et al., "The Event Horizon General Relativistic Magnetohydrodynamics Code Comparison Project," ApJS, 243, 26P, 2019, 10.3847/1538-4365/ab29fd

10. The Event Horizon Telescope Collaboration, et al., "First M87 Event Horizon Telescope Results. VI. The Shadow and Mass of the Central Black Hole," ApJL, 875, L6, 2019, 10.3847/2041-8213/ab1141

9. The Event Horizon Telescope Collaboration, et al., "First M87 Event Horizon Telescope Results. V. Physical Origin of the Asymmetric Ring," ApJL, 875, L5, 2019, 10.3847/2041-8213/ab0f43

8. The Event Horizon Telescope Collaboration, et al., "First M87 Event Horizon Telescope Results. IV. Imaging the Central Supermassive Black Hole," ApJL, 875, L4, 2019, 10.3847/2041-8213/ab0e85

7. The Event Horizon Telescope Collaboration, et al., "First M87 Event Horizon Telescope Results. III. Data Processing and Calibration," ApJL, 875, L3, 2019, 10.3847/2041-8213/ab0c57

6. The Event Horizon Telescope Collaboration, et al., "First M87 Event Horizon Telescope Results. II. Array and Instrumentation," ApJL, 875, L2, 2019, 10.3847/2041-8213/ab0c96

5. The Event Horizon Telescope Collaboration, et al., "First M87 Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole," ApJL, 875, L1, 2019, 10.3847/2041-8213/ab0ec7

4. T. S. Rappaport, S. Sun, R. Mayzus, H. Zhao, et al., "Millimeter Wave Mobile Communications for 5G Cellular: It Will Work!," IEEE Access, Vol. 1, pp. 335-349, 2013, 10.1109/ACCESS.2013.2260813

3. Y. Azar, **G. N. Wong**, K. Wang, R. Mayzus, et al., "28 GHz Propagation Measurements for Outdoor Cellular Communications Using Steerable Beam Antennas in New York City," 2013 IEEE International Conference on Communications (ICC), 10.1109/ICC.2013.6655399

2. H. Zhao, R. Mayzus, S. Sun, M. Samimi, et al., "28 GHz Millimeter Wave Cellular Communication Measurements for Reflection and Penetration Loss In and Around Buildings in New York City," 2013 International Conference on Communications (ICC), 10.1109/ICC.2013.6655403

1. M. Samimi, K. Wang, Y. Azar, **G. N. Wong**, et al., "28 GHz Angle of Arrival and Angle of Departure Analysis for Outdoor Cellular Communications Using Steerable Beam Antennas in New York City," 77th Vehicular Technology Conference (VTC Spring) 2013 10.1109/VTCSpring.2013.6691812