Yilun Guan

Schmidt AI in Science Fellow
Dunlap Institute for Astronomy & Astrophysics
University of Toronto
github.com/guanyilun

Research Positions

2024 – Present **Schmidt AI in Science Fellow**
University of Toronto, Toronto, CA
Dunlap Institute for Astronomy and Astrophysics

2021 – 2024 **Postdoctoral Fellow**
University of Toronto, Toronto, CA
Dunlap Institute for Astronomy and Astrophysics

Education

2016 – 2021 **Ph.D. in Physics**
University of Pittsburgh, Pittsburgh, PA
Thesis: "Topics on Microwave Astronomy and Cosmology"
Advisor: Prof. Arthur Kosowsky

2010 – 2014 **B.Sc. in Physics**
National University of Singapore, Singapore

Fellowships and Awards

2024 – 2026 **Eric and Wendy Schmidt AI in Science Postdoctoral Fellowship**
Awarded by Schmidt Sciences to 160 postdoctoral fellows to advance AI applications in scientific research.

2020 – 2021 **A&S PITT PACC Fellowship**
Awarded by the Pittsburgh Particle Physics, Astrophysics and Cosmology Center for excellence in graduate research.

2017 – 2018 **Thomas-Lain Scholarship Award**
Awarded by the Pittsburgh Foundation based on an essay competition for graduate students at the University of Pittsburgh.

2016 – 2017 **A&S Graduate Fellowship**
Offered by the University of Pittsburgh to first-year Ph.D. students in good academic standing.

Mentorship

* denotes an official supervisor role

Graduate Students

Rebecca Dudley (UofT)	2024–
Lawrence Lin (Cornell)	2024–
Aarya Patil (UofT)	2022–2023
Simran Nerval (UofT)	2021–2024
Erika Hornecker (UofT)	2021–2024
Margaret Ikape (UofT)	2021–2025

Ajay Gill (UofT)	2021–2024
Jason Leung (UofT)	2021–2023

Undergraduate Students

Dorian Pascal* (UofT)	2025–
Yiquan Mao* (UofT)	2025–
Charles Chen* (UofT)	2025–
Abdulaziz Alkharjy* (KAUST)	2025–2025
Anas Abdulrahman J Alshehri* (KAUST)	2025–2025
Mehtab Cheema* (UofT)	2025–2025
Zeinab Imani* (York)	2025–2025
Max Bridgewater* (UofT)	2024–2024
Aarya Prakash* (UofT)*	2024–2025
Zhen Sun* (UofT)	2023–2024
Louis Branch* (UofT)	2022–2025
Ian Niebres* (UofT)	2022–2023
Brandon Cane (Pitt)	2018-2020
Janvi Madhani (Pitt)	2018-2019

Talks

Astrophysics colloquium, University of Virginia – NRAO, Charlottesville, VA	2025
Invited talk, Institute of High Energy Physics, Chinese Academy of Sciences	2024
Talk, SPIE Astronomical Telescopes + Instrumentation, Yokohama, Japan	2024
Lunch talk, CMB x LSS Lunch Seminar, University of Cambridge	2023
Invited talk, Institute of High Energy Physics, Chinese Academy of Sciences	2023
Lunch seminar, University of Nottingham	2023
Invited talk, CMB-S4 Spring Meeting	2023
Invited talk, Machine Learning at High Energy Physics Workshop	2023
Lunch talk, Astro TASTY Talk Series, University of Toronto	2022
Lunch talk, Cosmology Lunch, CITA	2022
Invited talk, Supernova/Dust Tele-talk Series	2021
Invited talk, CMB-S4 Galactic ISM in 3D Workshop	2021
Invited talk, Pan-Experiment Galactic Science Group	2021
Lunch talk, Gravity Lunch Seminar, Princeton University	2021

Teaching Experience

2017 – 2018 **Graduate Teaching Assistant**, University of Pittsburgh
Conducted lab sessions, recitations, held office hours, and graded for undergraduate physics courses.
Courses: PHYS 0212: Intro to Laboratory Physics, PHYS 0175: Basic Physics for Science and Engineering II

Service and Outreach

Jul 2024	Co-organized and taught at "Coding-the-Cosmos," a summer camp for high school students from underserved communities in the GTA.
Mar 2024	Taught at the solar eclipse workshop series at Toronto Public Library.
Jul 2023	Organized and taught at the "Age-of-the-Universe" workshop for GTA high school students.
May 2023	Public lecture at AstroTours, University of Toronto.
Feb 2023	Public lecture at RASC David Dunlap Observatory Speakers Night.

Publications

Total publications: 52, h-index: 25, Total citations: 5072 (Google Scholar)
A full list is available on Google Scholar. My name is in bold.

[1] Clancy, J., Bacciagalupi, C., Borrow, J., et al. (including **Guan, Y.**) "The Simons Observatory: Development of a Pipeline to Detect Rapid Transients in Time-Ordered Data," arXiv:2512.11313, submitted (2025).

[2] **Guan, Y.** "Probing time-dependent physics with phase-folding CMB maps," arXiv:2511.09503, submitted (2025).

[3] Gill, A. S., **Guan, Y.**, et al. "The thermal and kinematic Sunyaev-Zeldovich effect in galaxy clusters and filaments using multifrequency temperature maps of the cosmic microwave background: Abell 399–Abell 401 cluster pair case study," arXiv:2510.18153, submitted (2025).

[4] Cai, H., Zhang, P., **Guan, Y.** "Eternal inflation bubble collision signature on CMB remote dipole and quadrupole fields," arXiv:2510.12134, submitted (2025).

[5] **Guan, Y.**, Naess, S., Niebres, I., Branch, L., Hincks, A. D., et al. "Atacama Cosmology Telescope: Constraints on the Millimetre Flux of the Crab Pulsar," arXiv:2509.11960, submitted (2025).

[6] Abitbol, M., et al. (including **Guan, Y.**) "The Simons Observatory: science goals and forecasts for the enhanced Large Aperture Telescope," Journal of Cosmology and Astroparticle Physics 2025 (08), 034 (2025).

[7] Biermann, E., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: systematic transient search of single observation maps," The Astrophysical Journal 986 (1), 7 (2025).

[8] McCarthy, F., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: Large-scale velocity reconstruction with the kinematic Sunyaev-Zel'dovich effect and DESI LRGs," Journal of Cosmology and Astroparticle Physics 2025 (05), 057 (2025).

[9] Morris, T. W., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: Quantifying atmospheric emission above Cerro Toco," Physical Review D 111 (8), 082001 (2025).

[10] Hincks, A. D., et al. (including **Guan, Y.**) "Atacama Cosmology Telescope: Observations of supermassive black hole binary candidates. Strong sinusoidal variations at 95, 147 and 225 GHz in PKS 2131-021...," arXiv:2504.04278, submitted (2025).

[11] Lokken, M., et al. (including **Guan, Y.**) "Superclustering with the Atacama Cosmology Telescope and Dark Energy Survey. II. Anisotropic Large-scale Coherence in Hot Gas, Galaxies, and Dark Matter," The Astrophysical Journal 982 (2), 186 (2025).

[12] Naess, S., **Guan, Y.**, et al. "The Atacama Cosmology Telescope: DR6 Maps," arXiv:2503.14451 (2025).

[13] Louis, T., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: DR6 Power Spectra, Likelihoods and CDM Parameters," arXiv:2503.14452 (2025).

[14] Calabrese, E., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: DR6 constraints on extended cosmological models," arXiv:2503.14454 (2025).

[15] Nerval, S. K., Hornecker, E., **Guan, Y.**, et al. "The Atacama Cosmology Telescope: The Development of Machine Learning Tools for Detecting Millimeter Sources in Timestream Pre-processing," arXiv:2503.10798 (2025).

[16] Wenzl, L., et al. (including **Guan, Y.**) "Atacama Cosmology Telescope: DR6 gravitational lensing and SDSS BOSS cross-correlation measurement and constraints on gravity with the statistic," Physical Review D 111 (4), 043535 (2025).

[17] Cai, H., **Guan, Y.**, Namikawa, T., Kosowsky, A. "Efficient estimation of rotation-induced bias to reconstructed CMB lensing power spectrum," Physical Review D 110 (10), 103507 (2024).

[18] **Guan, Y.**, Harrington, K., Lashner, J., et al. "Simons Observatory: observatory scheduler and automated data processing," Software and Cyberinfrastructure for Astronomy VIII 13101, 343-358 (2024).

[19] Coulton, W. R., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: A measurement of galaxy cluster temperatures through relativistic corrections to the thermal Sunyaev-Zeldovich effect," arXiv:2410.19046 (2024).

[20] Isopi, G., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: a census of bridges between galaxy clusters," arXiv:2410.14404 (2024).

[21] MacCrann, N., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: reionization kSZ trispectrum methodology and limits," Monthly Notices of the Royal Astronomical Society 532 (4), 4247-4260 (2024).

[22] MacCrann, N., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: Mitigating the impact of extragalactic foregrounds for the DR6 cosmic microwave background lensing analysis," The Astrophysical Journal 966 (1), 138 (2024).

[23] Coulton, W., et al. (including **Guan, Y.**) "Atacama Cosmology Telescope: High-resolution component-separated maps across one third of the sky," Physical Review D 109 (6), 063530 (2024).

[24] Qu, F. J., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: A measurement of the DR6 CMB lensing power spectrum and its implications for structure growth," The Astrophysical Journal 962 (2), 112 (2024).

[25] Madhavacheril, M. S., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: DR6 gravitational lensing map and cosmological parameters," The Astrophysical Journal 962 (2), 113 (2024).

[26] Atkins, Z., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: map-based noise simulations for DR6," Journal of Cosmology and Astroparticle Physics 2023 (11), 073 (2023).

[27] Li, Y., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: systematic transient search of 3 day maps," The Astrophysical Journal 956 (1), 36 (2023).

[28] Li, Z., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: limits on dark matter-baryon interactions from DR4 power spectra," Journal of Cosmology and Astroparticle Physics 2023 (02), 046 (2023).

[29] Cai, H., **Guan, Y.**, Namikawa, T., Kosowsky, A. "Impact of anisotropic birefringence on measuring cosmic microwave background lensing," Physical Review D 107 (4), 043513 (2023).

[30] Radiconi, F., et al. (including **Guan, Y.**) "The thermal and non-thermal components within and between galaxy clusters Abell 399 and Abell 401," Monthly Notices of the Royal Astronomical Society 517 (4), 5232-5246 (2022).

[31] **Guan, Y.**, Kosowsky, A. "Distinguishing primordial magnetic fields from inflationary tensor perturbations in the cosmic microwave background," Physical Review D 106 (6), 063505 (2022).

[32] Lungu, M., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: measurement and analysis of 1D beams for DR4," Journal of Cosmology and Astroparticle Physics 2022 (05), 044 (2022).

[33] Cai, H., **Guan, Y.** "Computing microwave background polarization power spectra from cosmic birefringence," Physical Review D 105 (6), 063536 (2022).

[34] **Guan, Y.** "Topics in microwave astronomy and cosmology," University of Pittsburgh (PhD Thesis) (2021).

[35] Naess, S., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: A Search for Planet 9," The Astrophysical Journal 923 (2), 224 (2021).

[36] Li, Y., et al. (including **Guan, Y.**) "Constraining cosmic microwave background temperature evolution with Sunyaev–Zel'Dovich galaxy clusters from the Atacama Cosmology Telescope," The Astrophysical Journal 922 (2), 136 (2021).

[37] **Guan, Y.**, Clark, S. E., Hensley, B. S., et al. "The Atacama Cosmology Telescope: microwave intensity and polarization maps of the Galactic Center," The Astrophysical Journal 920 (1), 6 (2021).

[38] Thiele, L., **Guan, Y.**, Hill, J. C., Kosowsky, A., Spergel, D. N. "Can small-scale baryon inhomogeneities resolve the Hubble tension? An investigation with ACT DR4," Physical Review D 104 (6), 063535 (2021).

[39] Vavagiakis, E. M., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: Probing the baryon content of SDSS DR15 galaxies with the thermal and kinematic Sunyaev-Zel'dovich effects," Physical Review D 104 (4), 043503 (2021).

[40] Calafut, V., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: Detection of the pairwise kinematic Sunyaev-Zel'dovich effect with SDSS DR15 galaxies," Physical Review D 104 (4), 043502 (2021).

[41] Mallaby-Kay, M. A., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: Summary of DR4 and DR5 data products and data access," The Astrophysical Journal Supplement Series 255 (1), 11 (2021).

[42] Naess, S., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: detection of millimeter-wave transient sources," The Astrophysical Journal 915 (1), 14 (2021).

[43] Schaan, E., et al. (including **Guan, Y.**) "Atacama Cosmology Telescope: Combined kinematic and thermal Sunyaev-Zel'dovich measurements from BOSS CMASS and LOWZ halos," Physical Review D 103 (6), 063513 (2021).

[44] Darwish, O., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: A CMB lensing mass map over 2100 square degrees of sky and its cross-correlation with BOSS-CMASS galaxies," Monthly Notices of the Royal Astronomical Society 500 (2), 2250-2263 (2021).

[45] Choi, S. K., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: a measurement of the Cosmic Microwave Background power spectra at 98 and 150 GHz," Journal of Cosmology and Astroparticle Physics 2020 (12), 045 (2020).

[46] Aiola, S., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: DR4 maps and cosmological parameters," Journal of Cosmology and Astroparticle Physics 2020 (12), 047 (2020).

[47] Madhavacheril, M. S., et al. (including **Guan, Y.**) "The Atacama Cosmology Telescope: weighing distant clusters with the most ancient light," The Astrophysical Journal Letters 903 (1), L13 (2020).

[48] Namikawa, T., **Guan, Y.**, Darwish, O., Sherwin, B. D., et al. "Atacama Cosmology Telescope: constraints on cosmic birefringence," Physical Review D 101 (8), 083527 (2020).

[49] Ade, P., et al. (including **Guan, Y.**) "The Simons Observatory: science goals and forecasts," Journal of Cosmology and Astroparticle Physics 2019 (02), 056 (2019).

[50] Abitbol, M., et al. (including **Guan, Y.**) "Astro2020 APC White Paper Project: The Simons Observatory," (2019).

[51] Abitbol, M., et al. (including **Guan, Y.**) "The simons observatory: Astro2020 decadal project whitepaper," arXiv:1907.08284 (2019).

[52] **Guan, Y.**, Nguyen, D. Q., Xu, J., Gong, J. "Reexamination of measurement-induced chaos in entanglement-purification protocols," Physical Review A 87 (5), 052316 (2013).

References

Available upon request.