



Calvin Leung

Curriculum Vitae

Professional Appointments

References: Kiyoshi Masui, David Kaiser, Matt Dobbs, Vicky Kaspi, Paul Schechter

- 2024- **Miller Postdoctoral Fellow**, *Miller Institute for Basic Research in Science*, Berkeley, CA.
- 2023-2024 **NASA Hubble Fellowship Program - Einstein Fellow**, *UC Berkeley Department of Astronomy*, Berkeley, California.
- 2021-2023 **Graduate Research Assistant**, *Massachusetts Institute of Technology*, Cambridge, MA, *GPA – 4.9/5.0*.
- 2017-2021 **NDSEG Fellow**, *Massachusetts Institute of Technology*, Cambridge, MA, *GPA – 4.9/5.0*.
- 2017-2018 **Visiting Researcher**, *Zeilinger Group*, *Institute for Quantum Optics and Quantum Information (IQOQI)*, Vienna, Austria.
- 2013-2017 **Bachelor of Science**, *Harvey Mudd College*, Claremont, *GPA – 3.9/4.0*.
Physics & Mathematics; Graduated with High distinction
Thesis: “Quantum Foundations with Astronomical Photons”

Awards and Recognition

- 2023 **NSF Astronomy and Astrophysics Postdoctoral Fellowship**, (*declined*).
- 2023 **Margaret and Ragner Naess Award**, *University-wide award (\$150) in recognition of exceptional talent and commitment to musical performance at MIT*.
- 2017-2021 **National Defense Science and Engineering Graduate Fellowship (NDSEG)**.
- 2020 **URSI GASS Student Paper Competition**, *Conference award (\$750) for best student-led conference paper presented at the URSI GASS 2020 conference*.

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- 2017 **American Physical Society LeRoy Apker Award**, For “outstanding achievements in physics by an undergraduate student”. One of two annual awardees nationwide.
- 2017 **Astronaut Scholarship**, National scholarship (\$10,000) awarded to ≈ 40 students annually.
- 2017 **Mindlin Prize**, University-wide award (\$2000) for “innovative ideas in science” awarded to the best thesis in the natural sciences in each graduating class.
- 2017 **Alfred B. Focke Award**, Departmental award (\$300) for “Outstanding Senior Thesis Research in Experimental Physics”.
- 2016 **Louise and Graydon Bell Prize**, Departmental award (\$200) for “outstanding scholarship, creativity, and service”.
- 2016 **Optical Society of America Best Poster**, “Best General Physics Poster” (\$200 prize) out of ~ 320 posters presented at 2016 Society of Physics Students Congress.

Community & Service

- 2023-2024 **Postdoctoral Representative**, Berkeley Astronomy Small Council, Act as liaison between postdoctoral community and department chair..
- 2023 **Lead Organizer**, NASA Hubble Fellowship Program Application Feedback Program, Organized volunteer-run, unofficial application review program to level the playing field for NHFP fellowship applicants..
- 2022 **Chair**, Graduate Student Search Committee, Organized 8+ meetings to solicit graduate student input for MIT Astrophysics Faculty Search, and presented student evaluations to MIT Physics faculty..
- 2021 **Graduate Student Representative**, MKI Anti-Racism Task Force, Identified barriers and biases in postdoctoral hiring procedures and recommended policy changes to Institute Director to reduce them. Resulted in hiring of Public Engagement Officer at MKI..
- 2021- **Referee**, Physical Review D, Physical Review Letters, Monthly Notices of the Royal Astronomical Society.
- 2018-2022 **PhysREFS**, (Resources for Easing Friction and Stress), Counseling students (≈ 5 /year) towards developing healthier advisor-student relationships; Community building and event planning within MIT Physics (≈ 4 /year).
- 2021 **Diversity Conduit**, Graduate Student Council, Work with department leadership to survey departmental DEI efforts and share best practices with other departments in a series of workshops and meetings.

Student Mentorship

I am especially enthusiastic to work with students from underrepresented backgrounds in astro/physics. I have supervised two undergraduate senior theses and have significant experience mentoring high school students (through a 501(c)(3) nonprofit).

- 2021-2023 Vishwangi Shah (McGill MSc '22); now McGill Physics PhD
- 2021-2023 Mattias Lazda (McGill BSc '22); now U of Toronto Astronomy and Astrophysics PhD
- 2020-2022 Eve Schoen (MIT BSc '22), undergraduate senior thesis student; winner of MIT Malcolm Cotton Brown Thesis Award; now Berkeley Physics PhD
- 2020-2022 Savannah Cary (Wellesley BSc '22), undergraduate senior thesis student; winner of John Charles Duncan Prize in Astronomy; now Fulbright-Japan & Berkeley Astronomy PhD)
- 2019-2020 Lulu (Eleanor) Russell (MIT BSc '22); now Berkeley Nuclear Science and Engineering PhD
- 2020 Lavanya Neti (Aspiring Scholars Directed Research Program '20); now UPenn '24
- 2020 Vinay Baid (Aspiring Scholars Directed Research Program '20); now UCSB CCS/Physics '24
- 2020 Jonathan Tam (Aspiring Scholars Directed Research Program '20); now UCLA MechE '24
- 2018 Beili (Nora) Hu (Harvey Mudd '18), now MIT Physics PhD

Presentations

An asterisk indicates an invited talk.

- 2024* “Radio transient localization at scale” at *Hotwiring the Transient Universe VII*, U of Toronto
- 2024* “Controlling AGN Feedback in cosmic shear with no parameters using fast radio bursts” at *Baryons in the Universe*, Kavli IPMU.
- 2024* “Disentangling Baryonic Feedback from Dark Matter using Fast Radio Bursts”, Carnegie Observatories.
- 2023* “Lensing of Fast Radio Bursts” at *Future of Fast Radio Bursts Workshop*, Flatiron Institute/Center for Computational Astrophysics, New York.
- 2023 “Microlensing to macrolensing of fast radio bursts” at Anton Pannenkoek Institute at the University of Amsterdam.
- 2023 “First Light with CHIME/FRB Outriggers” at *FRB 2023*.

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- 2023 “CHIME/FRB and its VLBI Outriggers” at *NASA Hubble Fellowship Symposium 2023* at the Center for Astrophysics/Harvard and Smithsonian.
- 2022 “A One-Off FRB Localized Using VLBI with CHIME/FRB” at *FRB 2022*.
- 2022* “Wave Optics in Gravitational Lensing” at International Space Science Institute (ISSI), Bern.
- 2022 “Lensing of Fast Radio Bursts” at International Space Science Institute (ISSI) Workshop on Strong Gravitational Lensing.
- 2022* “Localizations and Lenses: Looking towards Cosmology with CHIME’s FRBs”. UBC Astronomy Colloquium.
- 2021 “A One-Off FRB Localized Using VLBI with CHIME/FRB”. Science at Low Frequencies (SALF) VIII.
- 2021 “Localizations and Lenses: Looking towards Cosmology with CHIME’s FRBs”. Contributed talk at Harvard-Smithsonian Center for Astrophysics Sub-millimeter Array Seminar.
- 2021 Localizations and Lenses: Looking towards Cosmology with CHIME’s FRBs”. Caltech Observational Cosmology Seminar.
- 2020* “Cosmology with Fast Radio Bursts Localized by CHIME/FRB”. Invited talk at New England Theoretical Cosmology, Gravity and Fields Workshop.
- 2020* “A Synoptic VLBI Technique for Localizing a Non-Repeating Fast Radio Burst”. Prize/Award talk given at the General Assembly of the International Union of Radio Science (URSI GASS 2020).
- 2018* “Bell’s Inequality and Beyond with Astronomical Photons”. Prize/Award talk given at 2018 APS April Meeting.
- 2017* “Testing Bell’s Inequality with Astronomical Observations”. Invited talk given at APS LeRoy Apker Award Selection Meeting.
- 2017 “Testing Quantum Mechanics with Astronomical Photons.” Astronaut Scholars Technical Conference.

Public Engagement

Personal Preparation

- 2022 Kavli SciComm Essentials Workshop and Seminar Series: An Introduction to the Alda Method
- 2018 Audience’s Choice award at Boston Museum of Science Quantum Matters Competition for my talk: “Dice, Casino Games, and Quantum Entanglement” explaining quantum cryptography to the general public.

Press Releases

- 2024 Press release for CHIME/FRB Outriggers in [Nature Research Communities](#): “A VLBI-localized FRB probes the ISM at $z \sim 0.2$.”
- 2023 Official press release for 2023 [NASA Hubble Fellowship Program](#).
- 2021 My work with CHIME/FRB was featured in articles in the [Boston Globe](#) and [Daily Mail Online](#).
- 2022 Photography featured in “[Quantum Legacies: Dispatches from an Uncertain World](#).”
- 2019 My interview about future prospects for quantum computing on [Foresight Radio](#) podcast.
- 2017 Cosmic Bell test featured on [PhysicsGirl](#) (383k YouTube views).
- 2018 Full-length PBS/NOVA documentary and discussion panelist at public premiere: (“[Einstein’s Quantum Riddle](#)”)
- 2017 Articles about Cosmic Bell test [Quanta Magazine](#) and [Physics World](#).

Refereed Publications

Publications in which I played a leading or major supporting role (10 first or corresponding). Trainee/journal names are **bolded**. * denotes equal contribution; † denotes corresponding author.

- 14 Leung, C., Andrew, S., Masui, K., et al. “[A VLBI Software Correlator for Fast Radio Transients.](#)” Submitted to the **Astronomical Journal**.
- 14 Andrew, S., Leung, C., Masui, K. et al. “[A VLBI Calibrator Grid at 600MHz for Fast Radio Transient Localizations with CHIME/FRB Outriggers.](#)” Submitted to the **Astronomical Journal**.
- 13 Cassanelli, T. *, Leung, C.*†, Sanghavi, P.* et al. . “[A fast radio burst localized at detection to a galactic disk using very long baseline interferometry.](#)” **Nature Astronomy**, October 2024 issue.
- 12 Leung, C. et al. “[Wave Mechanics, Interference, and Decoherence in Strong Gravitational Lensing.](#)” Submitted to **Springer Space Science Reviews**.
- 11 Sanghavi, P., Leung, C. et al. “[TONE: The array of dishes at the Green Bank Observatory.](#)” Submitted to **Journal of Astronomical Instrumentation**.
- 10 Leung, C. *, Kader, Z.* et al. “[Constraining Primordial Black Holes using Fast Radio Burst Gravitational-Lens Interferometry with CHIME/FRB.](#)” **Phys. Rev. D** 106, 043017 (2022).
- 9 Kader, Z. *, Leung, C.* et al. “[A High-Time Resolution Search for Compact Objects using Fast Radio Burst Gravitational Lens Interferometry with CHIME/FRB.](#)” **Phys. Rev. D** 106, 043016 (2022).
- 8 Mena-Parra, J., Leung, C., et al. “[A clock stabilization system for CHIME/FRB Outriggers.](#)” **The Astronomical Journal** 163.2 (2022): 48.
- 7 Cassanelli, T., Leung, C., et al. “[Localizing FRBs through VLBI with the Algonquin Radio Observatory 10-m Telescope.](#)” **The Astronomical Journal** 163.2 (2022): 65.
- 6 Michilli, D., et al incl. Leung, C. “[An Analysis Pipeline for CHIME/FRB Full-array Baseband Data.](#)” **The Astrophysical Journal** Vol. 910.2 (2021): 147.
- 5 Leung, C., et al. “[A Synoptic VLBI Technique for Localizing Non-Repeating Fast Radio Bursts with CHIME/FRB](#)”. **The Astronomical Journal**, 161.2 (2021): 81.
- 4 Leung, C., et al. [Testing the Weak Equivalence Principle Using Optical and Near-Infrared Crab Pulses.](#) **The Astrophysical Journal**, Vol. 861, 1.
- 3 Leung, C., et al. [Astronomical Random Numbers for Quantum Foundations Experiments.](#) **Phys. Rev. A**, 97.4 (2018): 042120.

- 2 Leung, C., Donnelly, T. D. “Measuring the Spatial Resolution of an Optical System in an Undergraduate Optics Laboratory.” **American Journal of Physics** 85.6 (2017): 429-438.
- 1 Leung, C., Mohanty, S.D. “Estimation of Unmodeled Gravitational Wave Transients with Spline Regression and Particle Swarm Optimization.” **SIAM Undergraduate Research Online** 8 (2015).

Non-Refereed/In prep Publications

- 3 Schoen, E., Leung, C., et al. “Scintillation Timescales of Bright FRBs Detected by CHIME/FRB.” **Research Notes of the AAS** 5.11 (2021): 271.
- 2 Cary, S., Mena Parra, J., Leung, C., et al. “Evaluating and Enhancing Candidate Clocking Systems for CHIME/FRB VLBI Outriggers.” **Research Notes of the AAS** 5.16 (2021): 216.
- 1 Leung, C., **Quantum Foundations with Astronomical Photons**. Undergraduate thesis supervised by Jason Gallicchio, awarded APS LeRoy Apker Award (2017).

Selected Contributing Author/Full-Collaboration Papers

- 2024 Lanman, A. incl. Leung, C. **CHIME/FRB Outriggers: KKO Station System and Commissioning Results**. **Astronomical Journal** 168, 87 (2024).
- 2022 Hur, Joonseok, et al incl. Leung, C. “Evidence of Two-Source King Plot Nonlinearity in Spectroscopic Search for New Boson.” **Phys. Rev. Lett.** 128.16 (2022): 163201.
- 2022 Kirsten, F., et al incl. Leung, C. “A repeating fast radio burst source in a globular cluster.” **Nature** 602.7898 (2022): 585-589.
- 2022 Sun, Y., et al incl. Leung, C. “Axion dark matter-induced echo of supernova remnants.” **Phys. Rev. D** 105, 063007 (2022).
- 2021 Bhardwaj, M., et al incl. Leung, C. “A nearby repeating fast radio burst in the direction of M81.” **The Astrophysical Journal Letters** 910.2 (2021): L18.
- 2021 CHIME/FRB Collaboration, “The first CHIME/FRB fast radio burst catalog.” **The Astrophysical Journal Supplement Series** 257.2 (2021): 59.
- 2020 CHIME/FRB Collaboration, “Periodic activity from a fast radio burst source.” **Nature** 582.7812 (2020): 351-355.
- 2020 CHIME/FRB Collaboration, “A bright millisecond-duration radio burst from a Galactic magnetar” **Nature** 587.7832 (2020): 54-58.
- 2020 Fonseca, E., et al incl. Leung, C. “Nine New Repeating Fast Radio Burst Sources from CHIME/FRB” **The Astrophysical Journal Letters** 891.1 (2020): L6.

- 2020 Counts, I., et al incl. Leung, C. [Nonlinear Isotope Shift in Yb+ Search for New Bosons](#). **Phys. Rev. Lett.**, Vol. 125.12 (2020): 123002.
- 2018 D. Rauch, et al incl. Leung, C. [Cosmic Bell Test Using Random Measurement Settings from High-Redshift Quasars](#). **Phys. Rev. Lett.**, Vol. 121, 080403.
- 2016 Handsteiner, J. et al incl. Leung, C. [“A Cosmic Bell Test with Measurement Settings from Astronomical Sources.”](#) **Phys. Rev. Lett.**, Vol. 118, Issue 6.