

Vincent Sze Him Lee

Postdoctoral Scholar, UC Berkeley

US Permanent Resident (green card holder)

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🌐 <https://inspirehep.net/authors/1992402>

🌐 <https://vincentshlee.github.io/>

UC Berkeley

Positions

- 2024 – present  **University of California, Berkeley**
Postdoctoral Scholar
-  **University of California, San Diego**
Visiting Scholar

Education

- 2019 – 2024  **Caltech**
Ph.D. in Physics
Thesis defended in 05/2024, degree conferred in 06/2025
Advisor: Prof. Kathryn M. Zurek
- 2015 – 2019  **The Chinese University of Hong Kong**
B.Sc in Physics (Enrichment Stream in Theoretical Physics)
Minor in Mathematics
Advisors: Prof. Ming Chung Chu, Prof. Kenneth Young
First Class Honors
- 2018  **University of California, Berkeley**
UCEAP exchange student

Publications

[Collaboration papers are labeled by an asterisk.]

Peer-reviewed Published Articles

- 1 L. Badurina, Y. Du, **V. S. H. Lee**, Y. Wang, and K. M. Zurek, “Detecting gravitational signatures of dark matter with atom gradiometers,” *Phys. Rev. D*, vol. 112, no. 6, p. 063 014, 2025.  DOI: [10.1103/xs7b-zgtj](https://doi.org/10.1103/xs7b-zgtj). arXiv: [2505.00781](https://arxiv.org/abs/2505.00781) [hep-ph].
- 2 L. Badurina, Y. Du, **V. S. H. Lee**, Y. Wang, and K. M. Zurek, “Signatures of linearized gravity in atom interferometers: A simplified computational framework,” *Phys. Rev. D*, vol. 111, no. 4, p. 042 002, 2025.  DOI: [10.1103/PhysRevD.111.042002](https://doi.org/10.1103/PhysRevD.111.042002). arXiv: [2409.03828](https://arxiv.org/abs/2409.03828) [gr-qc].
- 3 **V. S. H. Lee** and K. M. Zurek, “Proper time observables of general gravitational perturbations in laser interferometry-based gravitational wave detectors,” *Phys. Rev. D*, vol. 111, no. 12, p. 124 037, 2025.  DOI: [10.1103/6q7d-jz26](https://doi.org/10.1103/6q7d-jz26). arXiv: [2408.03363](https://arxiv.org/abs/2408.03363) [hep-ph].
- 4 S. M. Vermeulen *et al.*, “Photon-Counting Interferometry to Detect Geontropic Space-Time Fluctuations with GQuEST,” *Phys. Rev. X*, vol. 15, no. 1, p. 011 034, 2025.  DOI: [10.1103/PhysRevX.15.011034](https://doi.org/10.1103/PhysRevX.15.011034). arXiv: [2404.07524](https://arxiv.org/abs/2404.07524) [gr-qc].
- 5 **V. S. H. Lee**, K. M. Zurek, and Y. Chen, “Astronomical image blurring from transversely correlated quantum gravity fluctuations,” *Phys. Rev. D*, vol. 109, no. 8, p. 084 005, 2024.  DOI: [10.1103/PhysRevD.109.084005](https://doi.org/10.1103/PhysRevD.109.084005). arXiv: [2312.06757](https://arxiv.org/abs/2312.06757) [gr-qc].

- 6 * A. Afzal *et al.*, “The NANOGrav 15 yr Data Set: Search for Signals from New Physics,” *Astrophys. J. Lett.*, vol. 951, no. 1, p. L11, 2023.  DOI: [10.3847/2041-8213/acdc91](https://doi.org/10.3847/2041-8213/acdc91). arXiv: [2306.16219](https://arxiv.org/abs/2306.16219) [astro-ph.HE].
- 7 Y. Du, **V. S. H. Lee**, Y. Wang, and K. M. Zurek, “Macroscopic dark matter detection with gravitational wave experiments,” *Phys. Rev. D*, vol. 108, no. 12, p. 122 003, 2023.  DOI: [10.1103/PhysRevD.108.122003](https://doi.org/10.1103/PhysRevD.108.122003). arXiv: [2306.13122](https://arxiv.org/abs/2306.13122) [astro-ph.CO].
- 8 M. I. Gresham, **V. S. H. Lee**, and K. M. Zurek, “Astrophysical observations of a dark matter-Baryon fifth force,” *JCAP*, vol. 02, p. 048, 2023.  DOI: [10.1088/1475-7516/2023/02/048](https://doi.org/10.1088/1475-7516/2023/02/048). arXiv: [2209.03963](https://arxiv.org/abs/2209.03963) [astro-ph.HE].
- 9 S. Gukov, **V. S. H. Lee**, and K. M. Zurek, “Near-horizon quantum dynamics of 4D Einstein gravity from 2D Jackiw-Teitelboim gravity,” *Phys. Rev. D*, vol. 107, no. 1, p. 016 004, 2023.  DOI: [10.1103/PhysRevD.107.016004](https://doi.org/10.1103/PhysRevD.107.016004). arXiv: [2205.02233](https://arxiv.org/abs/2205.02233) [hep-th].
- 10 D. Li, **V. S. H. Lee**, Y. Chen, and K. M. Zurek, “Interferometer response to geontropic fluctuations,” *Phys. Rev. D*, vol. 107, no. 2, p. 024 002, 2023.  DOI: [10.1103/PhysRevD.107.024002](https://doi.org/10.1103/PhysRevD.107.024002). arXiv: [2209.07543](https://arxiv.org/abs/2209.07543) [gr-qc].
- 11 * Z. Arzoumanian *et al.*, “Searching for Gravitational Waves from Cosmological Phase Transitions with the NANOGrav 12.5-Year Dataset,” *Phys. Rev. Lett.*, vol. 127, no. 25, p. 251 302, 2021.  DOI: [10.1103/PhysRevLett.127.251302](https://doi.org/10.1103/PhysRevLett.127.251302). arXiv: [2104.13930](https://arxiv.org/abs/2104.13930) [astro-ph.CO].
- 12 **V. S. H. Lee**, A. Mitridate, T. Trickle, and K. M. Zurek, “Probing Small-Scale Power Spectra with Pulsar Timing Arrays,” *JHEP*, vol. 06, p. 028, 2021.  DOI: [10.1007/JHEP06\(2021\)028](https://doi.org/10.1007/JHEP06(2021)028). arXiv: [2012.09857](https://arxiv.org/abs/2012.09857) [astro-ph.CO].
- 13 **V. S. H. Lee**, S. R. Taylor, T. Trickle, and K. M. Zurek, “Bayesian Forecasts for Dark Matter Substructure Searches with Mock Pulsar Timing Data,” *JCAP*, vol. 08, p. 025, 2021.  DOI: [10.1088/1475-7516/2021/08/025](https://doi.org/10.1088/1475-7516/2021/08/025). arXiv: [2104.05717](https://arxiv.org/abs/2104.05717) [astro-ph.CO].

Manuscripts Submitted for Peer-review

- 1 K. V. Berghaus, Y. Du, **V. S. H. Lee**, *et al.*, “Physics beyond the Standard Model with the DSA-2000,” May 2025. arXiv: [2505.23892](https://arxiv.org/abs/2505.23892) [hep-ph].

Awards, Grants & Honors

Postgraduate

- | | |
|------|---|
| 2023 |  James A. Cullen Memorial Fellowship |
| |  David and Barbara Groce Travel Fund |

Undergraduate

- | | |
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| 2018 |  Professor and Mrs. Yau Wa Chan Scholarship |
| |  Professor Charles K. Kao Scholarship |
| 2017 |  University Exchange Scholarship |
| 2016, 2017 |  Scholarship for Physics Student |
| |  The KY Young & CK Ma Memorial Scholarship |
| 2015, 2016 |  Dean’s Honor’s List |
| |  CN Yang Scholarship |
| 2015, 2016, 2017 |  HKSAR Government Scholarship |
| |  Undergraduate Research Experience Grant |

Awards, Grants & Honors (continued)

- 2015  Physics Admission Scholarship
  Honors at Entrance

Invited Talks

- November 2025  **Stony Brook University:** YITP Seminar
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
-  **New York University:** Informal HEP Talk
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
-  **University of Wisconsin–Madison:** Theory Seminar (High Energy/Cosmology)
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
- September 2025  **The Chinese University of Hong Kong:** Physics Seminar
Quantum Gravity Signals in 4D Einstein gravity from 2D JT gravity
- April 2025  **Lawrence Berkeley National Laboratory:** Theory Seminar
Quantum Gravity Signals in 4D Einstein gravity from 2D JT gravity
-  **University of California, Berkeley:** Astrochat
Detecting Gravitational Signatures of Dark Matter with Atom Interferometers
- March 2025  **University of California, San Diego:** STRAND Seminar
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
- February 2025  **Harvard University:** GRASP/Particle Theory Seminar
Quantum Gravity Signals in 4D Einstein gravity from 2D JT gravity
- September 2024  **Fermi National Accelerator Laboratory (Fermilab):** Theory Seminar
Proper Time Observables and Laser/Atom Interferometers as Probes of BSM Physics
- April 2024  **The Chinese University of Hong Kong:** Physics Seminar
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
- December 2023  **Lawrence Berkeley National Laboratory:** Theory Seminar
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
- October 2023  **Princeton University:** Dark Cosmos Seminar
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
-  **University of California, Los Angeles:** TEPAPP Seminar
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
- September 2023  **SLAC National Accelerator Laboratory:** EPP Seminar
Probing Dark Matter with Pulsar Timing Arrays and Gravitational Wave Detectors
- March 2021  **Caltech:** Radio Group Journal Club
Probing Small-Scale Power Spectra with Pulsar Timing Arrays

Teaching Positions

Caltech (TA)

Spring 2024	■	Ph237: Gravitational Radiation
Spring 2023	■	Ph1c (Practical): Classical Mechanics and Electromagnetism
Fall 2022	■	Ph230a: Elemental Particle Theory
Spring 2021	■	Ph1c (Practical): Classical Mechanics and Electromagnetism
Fall 2021	■	Ph230a: Elemental Particle Theory
Spring 2020	■	Ph139: Introduction to Particle Physics
Winter 2020	■	Ph121b: Computational Physics Lab

Conferences & Schools

Conferences

September 2025	■	GalFRESCA 2025: University of California, San Diego Speaker
May 2025	■	Berkeley Axion Workshop 2025: Lawrence Berkeley National Laboratory Participant
January 2025	■	Observables in Quantum Gravity: From Theory to Experiment: Aspen Center for Physics Participant
November 2024	■	Discovering Continuous GW with Nuclear, Astro and Particle Physics: Institute of Nuclear Theory (INT), University of Washington Participant
	■	Bay Area Strings, Information & Cosmology Symposium: University of California, Berkeley Participant
September 2024	■	Unraveling the Particle World and the Cosmos at Berkeley: University of California, Berkeley Participant
May 2023	■	Phenomenology 2023 Symposium: University of Pittsburgh Parallel session speaker
March 2023	■	UCLA Dark Matter 2023: University of California, Los Angeles Participant

Schools

July 2025	■	N3AS Summer School in Multi-Messenger Astrophysics: University of California, Santa Cruz Participant
July 2024	■	N3AS Summer School in Multi-Messenger Astrophysics: University of California, Santa Cruz Participant
June 2024	■	Theoretical Advanced Study Institute in Elementary Particle Physics (TASI) 2024 - "The Frontiers of Particle Theory": University of Colorado, Boulder Participant
July 2023	■	N3AS Summer School in Multi-Messenger Astrophysics: University of California, Santa Cruz Participant

Service

Reviewer of Academic Journals

Physical Review Letters	2 reviews
Physical Review D	5 reviews
Journal of High Energy Physics	4 reviews
Physics Letters B	1 review

Codes

Python Dark Matter - Pulsar Timing Array Monte Carlo <https://github.com/szehiml/dm-ptamc>

Skills

Coding Python, IDL, Bash, Mathematica, $\text{\LaTeX}$