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Current appointment

- Carnegie and Harrison Postdoctoral Fellow, Carnegie Observatories, 08/2023 – present.

Research interests

Finding and characterizing stellar-mass black holes using photometric and astrometric microlensing, radial velocities, and astrometric orbits.

Education

- Ph.D. Astrophysics, University of California, Berkeley, 08/2023.
  Understanding the Galactic Black Hole Population with Gravitational Microlensing
  Advisor: Prof. Jessica R. Lu
- M.A. Astrophysics, University of California, Berkeley, 05/2019.
- S.B. Mathematics and Physics, Massachusetts Institute of Technology, 06/2017.

Grants and Awards

- As PI: HST GO-17820 Grant ($71,626, 2025 – 2028)
  First mass measurement of black holes in a globular cluster
- UC Berkeley Astronomy Department Uhl Prize (2023)
  For outstanding scholarly achievement by a finishing grad student.
- NASA FINESST Research Grant ($90,000; 2021 – 2023)
- As PI: HST GO-16760 Grant ($54,438; 2021 – 2023)
  First detection of an isolated stellar mass black hole with astrometric microlensing
- H2H8 Research Grant ($10,000; 2021)
- UC Berkeley Astronomy Department Trumpler Award (2021)
  For academic excellence and outstanding involvement in department/astro community.
- UC Berkeley Outstanding Graduate Student Instructor (2019)
- NSF Graduate Research Fellowship Program Honorable Mention (2017, 2019)

Professional Activities and Service

To Carnegie Observatories (2023 – present):

- Carnegie Science Day organizer (11/24)
  Tour of Carnegie historical facilities and labs, 1-minute introductions by ~ 75 *community members (scientists, engineers, admin staff), 20 short talks by scientists*
- CASSI summer student intern Tea series organizer (Summer 2024)
  Lead "how to read a scientific paper" tutorial, schedule volunteers to lead weekly discussion, facilitate and encourage student questions
- CASSI summer student intern Intro to Python TA (6/24)
- arXiv Tea organizing committee (8/23 – present)
  Ensure schedule is filled with volunteers, coordinate external visitors, perform tech setup, solicit feedback on format, maintain high community engagement
- 1-minute introduction "lunch spectacular" organizer (9/23)
- CASSI summer student intern poster judge (8/23)

To the UC Berkeley Astronomy Department (2017 – 2023):

- arXiv Discussion Organizer (2022 – 2023)
- Grad student rep to Faculty Search (Spring 2021)
- Grad Wiki Master (2019 – 2022)
- Graduate student peer mentor (2019 – 2020)
- Prospective graduate student visit committee (Spring 2018)
- Undergraduate events (2018 – 2021)
  Q&A panelist $\times 3$*, graduate application feedback* $\times 2$*, poster judge.*

As part of the broader community:

- Roman Galactic Exoplanet Survey (RGES) Science Investigation Team member (2021)
- RGES Project Infrastructure Team (2023 – present)
  - Working Group 8: Contemporaneous and Precursor Observations
    Writing proposals/white papers to coordinating efforts with other facilities.
  - Working Group 10: Microlensing Mini-Courses
    Design and deliver lectures for upcoming summer REU and Sagan workshop.
- Magellan/MIKE proposal tutorial for Stanford/KIPAC (9/24)
- Telescope proposal reviewer (Gemini FT)
- Journal referee (AAS, MNRAS; 3 manuscripts since 2021)
- Graduate student mentor, CalBridge peer mentoring program (2019 – 2020)
- Local co-organizer for CalBridge Scholars Python Workshop (11/17, 1/19)

Outreach

At Carnegie Observatories (2023 – present):

- Volunteer at 6 different public outreach events.
  School visits, public lectures, hands-on demonstrations.
- Built a demonstration explaining how telescopes use mirrors to focus light

At UC Berkeley (2017 – 2023):

- UC Berkeley Astronomy Outreach Coordinator (2019 – 2022)
  Respond to external requests, coordinate volunteers for events, improve demos.
- Community Resources for Science "Be A Scientist" Mentor ($\times 4$)
  Guided 4-5 7th graders through a science project of their own design over 6 weeks.
- Volunteer/speaker at 18 different public outreach events.
  Stargazing, hands-on demonstrations for kids/families, public lectures.

Research Mentorship

Primary graduate student advisor for UC Berkeley undergrads advised by Prof. Jessica Lu:

- Samantha Rose: The Impact of Initial-Final Mass Relations on Black Hole Microlensing (2019 – 2022, published in ApJ)
- Angela Cheng: Microlensing maps with PopSyCLE (2019 - 2020)

Also acted as a secondary advisor for other UC Berkeley undergraduates working on microlensing (~ 3/year) and non-microlensing (~ 2/year) projects advised by Prof. Lu.

Workshops and professional development

- Alan Alda Workshop for Communicating Science (2023)
- Kraft Observational Astronomy Workshop, Lick Observatory (2017)

Teaching

- Graduate Student Instructor, Introduction to Astrophysics I (UCB, Fall 2018)
- Graduate Student Instructor, Introduction to Astrophysics II (UCB, Spring 2018)
- Graduate Student Instructor, Introduction to Astronomy (UCB, Fall 2017)
- Undergraduate Teaching Assistant, Electricity and Magnetism (MIT, Spring 2017)

Other skills

- Software: Python, LaTeX, Bash, Git, HTML, Mathematica, Matlab
- Languages: English (native), Cantonese (limited working/conversational)

Competitively Awarded Telescope Time

PI: Magellan (18 night), HST (14 orbit); Gemini (7 hr).
Major Co-I: Keck (15.5 night), APF (55 night), Magellan (7 night), HST (44 orbit).
Co-I: JWST (4.1 hr); HST (195 orbit), APF (21 night), Keck (1.5 night).

As PI:

- 3 nights, Magellan/MagE (2025A)
  Searching for black holes with metal-poor stellar companions
- 15 nights, Magellan/MIKE (2024A – 2025A)
  Uncovering the quiet population of black hole binaries
- 10 orbits, HST/WFC3-UVIS (Cycle 32)
  First mass measurement of black holes in a globular cluster
- 7 hours, Gemini North/MAROON-X (Fast Turnaround February 2024, June 2024)
  Precise and accurate eccentricities from radial velocities of eclipsing binaries
- 4 orbits, HST/WFC3-UVIS (Cycle 29)
  First detection of an isolated stellar mass black hole with astrometric microlensing

As Co-I with major contributions to proposal and execution of observations:

- 2 nights, Keck/KPF (2024B, PI: Kareem El-Badry)
  An unbiased eccentricity distribution from Kepler eclipsing binaries
- 17 nights, Lick/APF (2024B – 2025A, PI: Howard Isaacson)
  Precise and accurate eccentricities from radial velocities of eclipsing binaries
- 38 nights, Lick/APF (2024A – 2025A, PI: Jessica Lu)
  Finding Black Holes in Gaia's Astrometric Accelerators
- 7 nights, Magellan/IFUM (2024A – 2025A, PI: Kyle Kremer, Newlin Weatherford)
  Finding and confirming black hole binaries in globular clusters
- 40 orbits, HST/WFC3-UVIS (PI: Jessica Lu, Cycle 28 – 31)
  Hunting for Black Holes with Astrometric Microlensing
- 13.5 nights, Keck/NIRC2, OSIRIS w/ LGS AO (PI: Jessica Lu, 2019A – 2023A)
  Finding Black Holes with Astrometric Microlensing
- 4 orbits, HST/WFC3-UVIS (Mid-Cycle 28, PI: Sean Terry)
  Detection of the Astrometric Microlensing Signal by the Binary Black Hole Candidate MOA-2019-BLG-284

As Co-I:

- 4.1 hours, JWST/NIRCam (Cycle 3 DDT, PI: Jessica Lu)
  Finding Black Holes through Gravitational Microlensing
- 177 orbits, HST/WFC3-UVIS, ACS-WFC (Cycle 32, PI: Sean Terry)
  A Precursor Survey of the Roman Galactic Bulge Time Domain Fields

- 12 orbits, HST/WFC3-UVIS (Cycle 30 – 32, PI: David Bennett)
  Mass Measurement of a Candidate Black Hole Microlens with Systematic Error Control
- 6 orbits, HST/WFC3-UVIS (Cycle 28 DDT, PI: David Bennett)
  Mass Measurement of Isolated Black Hole Candidate MOA-2019-BLG-284L via Lensed Image Separation
- 21 nights, Lick/APF (2023A – 2023B, PI: Jessica Lu)
  Searching for Non-Interacting Compact Object Companions in Spectroscopic Binaries
- 1.5 nights, Keck/OSIRIS (2024B, PI: Jessica Lu)
  Finding Black Holes with Astrometric Microlensing

Scientific Presentations

9 invited talks (+2 upcoming), 22 contributed talks, 3 posters, 7 public talks.

* denotes invited presentations
^{R} denotes presentations given remotely over Zoom at online meetings/events

1. * Caltech Astronomy Tea Talk (upcoming 4/25, Caltech)
2. * Stellar black hole formation and detection (upcoming 3/25, Kyoto University, Japan)
3. * Caltech/IPAC Lunch Seminar (2/25, IPAC)
4. Challenging Theory with Roman: From Planet Formation to Cosmology (7/24, IPAC)
5. 26th International Microlensing Conference (2/24, LLNL)
6. RGES PIT Meeting (10/23, OSU^R; joint presentation with Jessica Lu)
7. UC Berkeley Astronomy, Dissertation Seminar (5/23, UC Berkeley)
8. 2023 Aspen Winter Conference: eXtreme Black Holes (3/23, Aspen Center for Physics)
9. * Lawrence Livermore National Lab, Seminar (2/23, LLNL)
10. Roman Virtual Lecture Series (1/23, IPAC^R)
11. AAS 241 Dissertation Talk (1/23, Seattle^R)
12. * KIPAC Tea Talks (11/22, Stanford^R)
13. UCLA Astronomy Tuesday Lunch Seminar (10/22, UCLA)
14. * Caltech TAPIR Seminar (10/22, Caltech)
15. IfA Astrocoffee Talks (10/22, UH Manoa^R)
16. NSF NOIRLab-Tucson Friday Lunch Astrophysics Seminar (9/22, NOIRLab^R)
17. MIT Kavli Brown Bag Lunch Talks (9/22, MIT^R)
18. 25th International Microlensing Conference (8/22, Paris^R)
19. * Princeton Coffee (2/22, Princeton^R)

20. * UCLA Galactic Center Group Journal Club (2/22, UCLA^R)
21. * Carnegie Tea (2/22, Carnegie Observatories^R)
22. * CCAPP Seminar (2/22, Ohio State University^R)
23. Exploring the Transient Universe with the Roman Space Telescope (2/22, Caltech^R)
24. UC Berkeley Astronomy Thursday Short Talks (10/21, UC Berkeley)
25. UC Berkeley Astronomy Thursday Short Talks (3/21, UC Berkeley^R)
26. UC Berkeley Astronomy Thursday Lunch Talks (11/20, UC Berkeley^R)
27. Poster, Keck Science Meeting 2020 (9/20, Caltech^R)
28. UC Berkeley Astronomy Thursday Lunch Talks (4/20, UC Berkeley^R)
29. UC Berkeley Astronomy Thursday Lunch Talks (11/19, UC Berkeley)
30. TMT Science Forum 2019 (11/19, Xiamen University, China)
31. * Lawrence Livermore National Lab, Physical and Life Sciences Seminar (10/19, LLNL)
32. Poster, Keck Science Meeting 2019 (9/19, UCLA)
33. Exploring the Galaxy and the Local Group with WFIRST (6/19, Caltech)
34. 23rd International Microlensing Conference (1/19, Flatiron CCA)
35. UC Berkeley Astronomy Thursday Lunch Talks (11/18, UC Berkeley)
36. Poster, Keck Science Meeting 2018 (9/18, Caltech)

Public outreach, fundraising, or student talks

37. CASSI summer intern seminar series (6/24, Carnegie Observatories)
38. H2H8 Association YouTube Research Talks^R (1/23, H2H8)
39. 2020 Bay Area Science Festival^R (10/20, SF Bay Area)
40. UC Berkeley Astrophysics Roundtable (11/19, UC Berkeley)
41. UC Berkeley Compass Lecture Series for Undergraduates (10/19, UC Berkeley)
42. Berkeley Public Library Claremont (7/19, Berkeley)
43. MIT Parents Weekend Physics Department Reception (10/16, MIT)

Publications

Abstracts can be accessed at my public ADS library: `https://ui.adsabs.harvard.edu/public-libraries/ARVK9mO2QBiU0xlkO8Tu0Q`

- 19 refereed/in review publications (5 as first author, 1 as primary research mentor).
- 12 non-refereed/white papers (2 as first author).

† = directly supervised student.

1st author, Refereed/in review

1. **Lam, C. Y.**, El-Badry, K., and Simon, J. D. "A Fast Analytic Empirical Model of the *Gaia* Data Release 3 Astrometric Orbit Catalog Selection Function". Submitted to ApJ, Oct 2024.
2. **Lam, C. Y.** and Lu, J. R. "A re-analysis of the isolated black hole candidate OGLE-2011-BLG-0462/MOA-2011-BLG-191." *ApJ* **955** 116, Sep 2023.
3. **Lam, C. Y.**, Lu, J. R., Udalski, A., Bond, I., Bennett, D. P., Skowron, J., Mróz, P., Poleski, R., and 37 additional authors. "An Isolated Mass-gap Black Hole or Neutron Star Detected with Astrometric Microlensing." *ApJL* **933** L23, Jul 2022.
4. **Lam, C. Y.**, Lu, J. R., Udalski, A., Bond, I., Bennett, D. P., Skowron, J., Mróz, P., Poleski, R., and 37 additional authors. "Supplement: "An Isolated Mass-gap Black Hole or Neutron Star Detected with Astrometric Microlensing" (2022, ApJL, 933, L23)" *ApJS* **260** 55, Jul 2022.
5. **Lam, C. Y.**, Lu, J. R., Hosek Jr., M. W., Dawson, W. A., and Golovich, N. R. "PopSyCLE: A New Population Synthesis Code for Compact Object Microlensing Events." *ApJ* **889** 31, Jan 2020.

n-th author, Refereed/in review

6. Abrams, N., Lu, J., **Lam, C. Y.**, Medford, M., Hosek, M., and Rose, S. "Assessing the Impact of Binary Systems on Microlensing Using SPISEA and PopSyCLE Population Simulations". *ApJ* **980** 103, Feb 2025.
7. Zhai, R., Rodriguez, A. C., Mao, S., **Lam, C. Y.**, Bellm, E. C., Purdum, J., Masci, F. J., and Wold, A. "Microlensing Events in Five Years of Photometry from the Zwicky Transient Facility". *ApJ* **978** 76, Jan 2025.
8. El-Badry, K., **Lam, C.**, Holl, B., Halbwachs, J.-L., Rix, H.-W., Mazeh, T., and Shahaf, S. "A Generative Model for *Gaia* Astrometric Orbit Catalogs: Selection Functions for Binary Stars, Giant Planets, and Compact Object Companions". *OJAp* **7** 100, Nov 2024.

9. Jurado, C., Naoz, S., **Lam, C. Y.**, and Hoang, B.-M. "Natal Kicks from the Galactic Center and Implications on their Environment and the Roman Space Telescope". *ApJ* **971** 95, Aug 2024.
10. Nagarajan, P., El-Badry, K., **Lam, C.**, and Reggiani, H. "The Symbiotic X-ray Binary IGR J16194-2810: A Window on the Future Evolution of Wide Neutron Star Binaries From Gaia". *PASP* **136** 074202, Jul 2024.
11. Pruett, K., Dawson, W., Medford, M. S., Lu, J. R., **Lam, C.**, Perkins, S., McGill, P., Golovich, N., and Chapline, G. "Primordial Black Hole Dark Matter Simulations Using PopSyCLE." *ApJ* **970** 169, Jul 2024.
12. Rowan, D. M., Jayasinghe, T., Tucker, M. A., **Lam, C. Y.**, Thompson, T. A., Kochanek, C. S., Abrams, N. S., Fulton, B. J., Ilyin, I., Issacson, H., Lu, J., Martin, D. V., and Nicholson, B. "A hidden population of massive white dwarfs: two spotted K+WD binaries". *MNRAS* **529** 587, Feb 2024.
13. Perkins, S. E., McGill, P., Dawson, W., Abrams, N. S., **Lam, C. Y.**, Ho, M.-F., Lu, J. R., Bird, S., Pruett, K., Golovich, N., and Chapline, G. "Disentangling the Black Hole Mass Spectrum with Photometric Microlensing Surveys". *ApJ*, **961** 179, Feb 2024.
14. Medford, M. S., Abrams, N. S., Lu, J. R., Nugent, P. and **Lam, C. Y.** "60 Microlensing Events from the Three Years of Zwicky Transient Facility Phase One." *ApJ*, **947** 24, Apr 2023.
15. Rose, S.[†], **Lam, C. Y.**, Lu, J. R., Medford, M., Hosek, M. W. Jr., Abrams, N., Ramey, E., and Vasylyev, S. "The Impact of Initial-Final Mass Relations on Black Hole Microlensing." *ApJ*, **941** 116, Dec 2022.
16. Golovich, N., Dawson, W., Bartolić, F., **Lam, C. Y.**, Lu, J. R., Medford, M. S., Schneider, M. D., Chapline, G., Schlafly, E. S., Drlica-Wagner, A., and Pruett, K. "A Reanalysis of Public OGLE-III and IV Gravitational Microlensing Events." *ApJS* **260** 2, Apr 2022.
17. Zhang, K., Bloom, J. S., Gaudi, B. S., Lanusse, F., **Lam, C.**, and Lu, J. "Real-Time Simulation-Based Inference of *Roman* Binary Microlensing Events with Amortized Neural Posterior Estimation." *AJ* **161** 262, May 2021.
18. Hosek Jr., M. W., Lu, J. R., **Lam, C. Y.**, Gautam, A. K., Lockhart, K. E., Kim, D., and Jia, S. "SPISEA: A Python-Based Simple Stellar Population Synthesis Code for Star Clusters." *AJ* **160** 143, Aug 2020.
19. Medford, M. S., Lu, J. R., Dawson, W. A., **Lam, C. Y.**, Golovich, N. R., Schlafly, E. F., and Nugent, P. "Gravitational Microlensing Event Statistics for the Zwicky Transient Facility." *ApJ* **897** 144, Jul 2020.

Unrefereed/white papers

20. **Lam, C. Y.** "Understanding the Galactic Black Hole Population with Gravitaitonal Microlensing." UC Berkeley PhD Thesis, Aug 2023.

21. **Lam, C. Y.**, and 36 additional authors. "Roman CCS White Paper: Characterizing the Galactic population of isolated black holes." arXiv:2306.12514 [astro-ph.IM], Jun 2023.
22. Street, R. A., Gough-Kelly, S., **Lam, C.**, Varela, A., Makler, M., and 11 additional authors. "Maximizing science return by coordinating the survey strategies of Roman with other major facilities." Roman CCS White Paper, arXiv:2306.13792 [astro-ph.IM], Jun 2023.
23. Terry, S. K., Hosek Jr., M. W., Lu, J. R., **Lam, C.**, and 30 additional authors. "The Galactic Center with Roman." Roman CCS White Paper, arXiv:2306.12485 [astro-ph.IM], Jun 2023.
24. Gaudi, B. S., Bennett, D. P., and 36 additional authors, incl. **Lam, C.** "The Roman Galactic Exoplanet Survey (RGES)". Roman Core Community Survey White Paper, Jun 2023. `https://asd.gsfc.nasa.gov/roman_wp_2023/`
25. Bahramian, A., Degenaar, N., Heinke C. O., **Lam, C.**, Maccarone, T. J., and Terry, S. K. "X-ray binaries, cataclysmic variables and transients in the Galactic bulge". Roman Core Community Survey White Paper, Jun 2023. `https://asd.gsfc.nasa.gov/roman_wp_2023/`
26. Gezari, S., and 30 additional authors, incl. **Lam, C.** "R2-D2: Roman and Rubin – From Data to Discovery." AURA-commissioned White Paper, arXiv:2202.12311 [astro-ph.IM], Feb 2022.
27. Lu, J. R., **Lam, C.**, Dawson, W., Gaudi, B. S., Golovich, N., Medford, M., Abdurrahman, F., and Beaton, R. L. "Astro2020: From Stars to Compact Objects: The Initial-Final Mass Relation." Astro 2020 Decadal White Paper, arXiv:1904.01773 [astro-ph.SR], Apr 2019.
28. Lu, J. R., **Lam, C. Y.**, Medford, M., Dawson, W., and Golovich, N. "Primordial Black Hole Microlensing: The Einstein Crossing Time Distribution." *Res. Notes AAS* **3** 58, Apr 2019.
29. Bechtol, K., Drlica-Wagner, A., and 178 additional authors, incl. **Lam, C.** "Dark Matter Science in the Era of LSST." Astro 2020 Decadal White Paper, arXiv:1903.04425 [astro-ph.CO], Mar 2019.
30. Drlica-Wagner, A., Mao, Y.-Y., and 97 additional authors, incl. **Lam, C. Y.** "Probing the Fundamental Nature of Dark Matter with the Large Synoptic Survey Telescope." LSST Dark Matter Group White Paper, arXiv:1902.01055 [astro-ph.CO], Feb 2019.
31. Bloomfield, J. K., Face, S. H. P., Guth, A. H., Kalia, S., **Lam, C.**, and Moss, Z. "Number Density of Peaks in a Chi-Squared Field." arXiv:1612.03890 [math-ph], Dec 2016.