Yue Samuel Lu

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https://y-samuel-lu.github.io

Research Interest

Galaxy formation/evolution, the circum/inter-galactic medium, cosmic rays, magnetic fields, large-scale structures, numerical simulations

Education

Sep 2022 – Present
University of California, San Diego (UCSD)
Ph.D. in *Physics* (expected: 2027-2028)
Thesis: *Non-thermal processes in galaxy formation and evolution*.
C.Phil./M.S. in *Physics* (Sep 2024)
GPA: 3.90/4.00
Advisor: *Dušan Kereš*

Sep 2018 – Jun 2022
University of California, Santa Barbara (UCSB)
B.S. in *Physics*; B.S. in *Mathematics*; Minor in *Astronomy*
Overall GPA: 3.82/4.00 (Physics GPA: 3.93, Math GPA: 3.92)
Consecutive Dean's Honors

Research Positions

2022 – Present
Graduate Student Researcher in FIRE Simulation Project (UCSD)
Worked on problems related to non-thermal processes in galaxy formation/evolution, including cosmic rays (CRs) and magnetic fields (B-fields) from the FIRE simulations

2020 – Present
Student Researcher on Intergalactic Filaments (KITP, UCSD)
Analyzed the structure and dynamics of intergalactic filaments in cosmological simulations. Explored observables related to this regime, including Lyman-α and X-ray. Developed analytic models

2020 – 2022
Undergraduate Researcher on AGN Accretion Disk (UCSB)
Explored MHD simulations run by the `Athena++` code and analyzed an $m = 2$ anomaly in an simulated AGN accretion disk

Selected Research Presentations

Mar 2026
Invited tea talk, Department of Physics, University of British Columbia, Vancouver, BC, Canada

Dec 2025
Informal talk, Department of Astronomy, Tsinghua University, Beijing, China
Informal talk, Fudan Center for Astronomy and Astrophysics, Shanghai, China

Sep 2025
Symposium talk, Galaxy Formation and Evolution in Southern California (GalFRESCA) 2025, UC San Diego

Aug 2025
Poster, Cosmic Ecosystems, Perimeter Institute for Theoretical Physics, Waterloo, ON, Canada

Sep 2024
Symposium talk, GalFRESCA 2024, Carnegie Observatories, Pasadena, CA

Aug 2024
Conference talk (video), 2024 Santa Cruz Galaxy Workshop, UC Santa Cruz

Dec 2023
Poster, International Conference on Resolving Galaxy Ecosystems on All Scales, CUHK, Hong Kong, China

Aug 2023
Conference talk (video), 2023 Santa Cruz Galaxy Workshop, UC Santa Cruz

Selected Research Presentations (continued)

Sep 2021 **Symposium talk** (video), UCSB Undergraduate Physics Research Symposium , online

Publications

As the first author

1. **Y. S. Lu**, D. Kereš, P. F. Hopkins, S. B. Ponnada, C.-A. Faucher-Giguère, and C. B. Hummels, *Constraining cosmic ray transport models using circumgalactic medium properties and observables*, Jan. 2026. DOI: 10.1093/mnras/staf1984. arXiv: 2505.13597 [astro-ph.GA].
2. **Y. S. Lu**, N. Mandelker, S. P. Oh, A. Dekel, F. C. van den Bosch, V. Springel, D. Nagai, and F. van de Voort, *The structure and dynamics of massive high-z cosmic-web filaments: three radial zones in filament cross-sections*, Feb. 2024. DOI: 10.1093/mnras/stad3779. arXiv: 2306.03966 [astro-ph.CO].

As a major contributor

1. S. B. Ponnada, P. F. Hopkins, **Y. S. Lu**, E. M. Silich, I. S. Butsky, and D. Kereš, *Strong Evidence for Cosmic-Ray-supported ∼L* Galaxy Halos via X-Ray and tSZ Constraints*, Jan. 2026. DOI: 10.3847/2041-8213/ae2fd9. arXiv: 2510.13959 [astro-ph.GA].
2. M. Roy, K.-Y. Su, S. Tonnesen, **Y. S. Lu**, C. Hummels, and S. B. Ponnada, *To Survive or to Shatter: The Impact of Cosmic Rays on the Fate of Stripped Cold Clouds*, Oct. 2025. DOI: 10.48550/arXiv.2510.21699. arXiv: 2510.21699 [astro-ph.GA].

As a minor contributor

1. K.-Y. Su, G. L. Bryan, P. F. Hopkins, P. Natarajan, S. B. Ponnada, R. Emami, **Y. S. Lu**, and M. Roy, *Modelling cosmic rays at AGN jet-driven shock fronts*, Jan. 2026. DOI: 10.1093/mnras/staf2060. arXiv: 2502.00927 [astro-ph.GA].
2. S. B. Ponnada, R. K. Cochrane, P. F. Hopkins, I. S. Butsky, S. Wellons, N. N. Sanchez, C. Hummels, **Y. S. Lu**, D. Kereš, and C. C. Hayward, *Hooks, Lines, and Sinkers: How Active Galactic Nucleus Feedback and Cosmic-Ray Transport Shape the Far-infrared–Radio Correlation of Galaxies*, Feb. 2025. DOI: 10.3847/1538-4357/ada280. arXiv: 2410.02971 [astro-ph.GA].

Selected Awards

2025 **Academic Senate Award**, UCSD
2024 **Distinguished Junior Teaching Award**, UCSD Physics department
2023 **Chair's Challenge Award**, UCSD Physics department
2022 **Graduation Honor**, UCSB College of Letters and Sciences
Department Honor, UCSB Physics Department

Teaching Experiences

Fall 2024–Present **1-series lab Lab TA Coordinator (LTAC)**, UCSD Physics Department
Oversaw a ∼ 1500-people pre-health/bio-major physics lab class; duties included ensuring smooth course delivery, training teaching assistants and graders, and coping with students feedback

Teaching Experiences (continued)

Fall 2022–Present — **Teaching Assistant**, UCSD Physics and A&A Department
Ran and instructed discussion sections and lab sections for undergraduate level physics and astronomy courses; graded homework assignments and/or exams. Courses have taught so far:

- **PHYS 1-series lab:** introductory lab course designed mainly for pre-health students
- **PHYS 2-series:** general physics aimed for science/engineering majors
- **PHYS 7:** galaxies and cosmology (general education level)
- **PHYS 13:** life in the universe (general education level)
- **PHYS 163:** galaxies (designed for upper division physics students)
- **ASTR 103:** dynamics of radiation and fluid (designed for upper division astronomy majors)
- **ASTR 104:** thermal astrophysics (designed for upper division astronomy majors)

2020–2021 — **Math, Physics, and Engineering Tutor**, UCSB Campus Learning Assistance Services (CLAS)
Taught lower division math and physics courses; ran group tutorials and drop-in sessions

2019–2022 — **Learning Assistant and Grader**, UCSB Physics Department
Assisted teaching assistants on running physics course discussion sessions; graded assignments and/or exams

Academic service and outreach

2023–2025 — **Colloquium and Journal Club Committee Member**, UCSD A&A Department

Apr 2024 — **Volunteer**, 2024 Continental U.S. Solar Eclipse Outreach Event

Skills

Human Languages — English (advanced), Mandarin Chinese (native), Spanish (elementary)

Coding Languages — Python, C/C++, bash, Matlab, Mathematica

Misc. — Academic research, teaching, training, consultation, LaTeX typesetting and publishing