YUE SAMUEL LU

◇ Department of Astronomy and Astrophysics ◇ SERF 431 ◇ UC San Diego ◇ CA 92093
◇ ✉ yul232@ucsd.edu ◇ ☎ (+1) 805-895-2719 ◇ 🏠 y-samuel-lu.github.io

GENERAL RESEARCH INTERESTS

Theoretical and Computational Astrophysics
The Circum/Inter-galactic Medium, Cosmic Rays, Magnetic Fields, Numerical Simulations

EDUCATION

• **University of California, San Diego (UCSD)** Sep. 2022—Sep. 2027 (expected)
Ph.D. in ***Physics***; C. Phil obtained in **Aug. 2024**
Current GPA: 3.90/4.00
Doctoral advisor: Dušan Kereš

• **University of California, Santa Barbara (UCSB)** Sep. 2018—Jun. 2022
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; Physics Department Honor; College of Letters and Sciences Graduation Honor

RESEARCH EXPERIENCES

Graduate Student Researcher in FIRE[1] Simulation Project 2022—Present
Prof. Dušan Kereš and FIRE collaboration *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

Intergalactic Filaments in Simulation 2020—2024
Prof. Nir Mandelker, Prof. S. Peng Oh *UCSD, UCSB/KITP[2], HUJI[3]*

· Analyzed the structure and dynamics of intergalactic filaments in cosmological simulations. Explored observables related to this regime, including Lyman-α and X-ray

AGN Accretion Disk 2020—2022
Prof. Omer Blaes *UCSB*

· Explored idealized MHD simulations run by the `Athena++` code and analyzed an $m = 2$ anomaly in an simulated AGN accretion disk

PUBLICATIONS

As the first author

1. **Lu, Y. S.**, Kereš, D.; Hopkins, P. F.; Ponnada, S. B.; Faucher-Giguere, C-A.; Hummels, C. (2025) Constraining cosmic ray transport models using circumgalactic medium properties and observables. Monthly Notices of the Royal Astronomical Society, 545(1), staf1984.

2. **Lu, Y. S.**; Mandelker, N.; Oh, S. P.; Dekel, A.;van den Bosch, F. C.; Springel, V.; Nagai, D.; van de Voort, F. (2024). The Structure and Dynamics of Massive High-z Cosmic-Web Filaments: Three Radial Zones in Filament Cross-Sections. Monthly Notices of the Royal Astronomical Society, 527(4), 11256-11287.

[1] https://fire.northwestern.edu
[2] Kavli Institute for Theoretical Physics
[3] The Hebrew University of Jerusalem

As a major contributor

1. Ponnada, S. B., Hopkins, P. F., **Lu, Y. S.**, Silich, E. M., Butsky, I. S., Keres, D. (2025). Strong Evidence for Cosmic Ray-Supported $\sim$ L * Galaxy Halos via X-ray& tSZ Constraints. The Astrophysical Journal Letters, 997(1), L13.
2. Roy, M., Su, K. Y., Tonnesen, S., **Lu, Y. S.**, Hummels, C., Ponnada, S. B. (2025). To Survive or to Shatter: The Impact of Cosmic Rays on the Fate of Stripped Cold Clouds. arXiv preprint arXiv:2510.21699.

As a minor contributor

1. Ponnada, S. B.; Cochrane, R. K.; Hopkins, P. F.; Bustky, I. S.; Wellons, S.; Sanchez, N. N.; Hummels, C.; **Lu, Y. S.**; Keres, D.; Hayward, C. C. (2024), Hooks, Lines, and Sinkers: How AGN Feedback and Cosmic-Ray Transport shape the Far Infrared-Radio Correlation of Galaxies. The Astrophysical Journal, 980(1), 135.
2. Su, K. Y., Bryan, G. L., Hopkins, P. F., Natarajan, P., Ponnada, S. B., Emami, R., & **, Lu, Y. S.** (2025). Modeling Cosmic Rays at AGN Jet-Driven Shock Fronts. Monthly Notices of the Royal Astronomical Society, 545(2), staf2060.

SELECTED RESEARCH PRESENTATIONS

Cosmic Ecosystems Poster
Jul–Aug 2025

Perimeter Institute for Theoretical Physics, Waterloo, ON, Canada

Annual Santa Cruz Galaxy Workshops Talks given
2023 (video), 2024 (video)

UC Santa Cruz, Santa Cruz, CA, USA

Galaxy Formation and Evolution in Southern California (GalFRESCA) Talks given
Sep 2024, Sep 2025

Southern California, CA, USA

International Conference on Resolving Galaxy Ecosystems on All Scales Poster
Dec 2023

The Chinese University of Hong Kong, Hong Kong SAR, China

UCSB Undergraduate Physics Research Symposium Talk given
Sep 2021 (video)

KITP & UCSB, online

TEACHING EXPERIENCES

UCSD Physics Department Fall 2024—present
1-series lab Lab TA Coordinator (LTAC)

Oversaw a $\sim$1500-people pre-health/bio-major physics lab class; duties included training teaching assistants, coordinating the grading, and making sure all weekly lab sections run smoothly

UCSD Physics Department/A&A Department Fall 2022—present
Teaching Assistant

Ran and instructed discussion sections and lab sections for undergraduate level physics courses; graded homework assignments and/or exams. Course have taught so far:

· **PHYS 1-series lab:** introductory lab course designed mainly for pre-med 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

· **ASTR 104:** thermal astrophysics

UCSB Campus Learning Assistance Services (CLAS) Fall 2020—Spring 2021
Math, Physics and Engineering Tutor

Taught lower division math and physics courses; ran group tutorials and drop-in sessions

UCSB Physics Department Fall 2019—Summer 2022
Learning Assistant and Grader

Assisted teaching assistants on running physics course discussion sessions; graded assignments and/or exams

ACADEMIC SERVICE / OUTREACH

UCSD Department of Astronomy and Astrophysics 2023-2025
Colloquium and Journal Club Committee

Helped on organizing and arranging weekly colloquia and journal clubs

UCSD Department of Astronomy and Astrophysics Apr 2024
2024 Continental U.S. Solar Eclipse Outreach Event

Volunteer

SKILLS

Coding Languages	Python, C/C++, Matlab, Mathematica
Scientific Computation	Numpy, SciPy, matplotlib, Numba, astropy
Numerical Simulation Suites	`AREPO`, `GIZMO`, `Athena/Athena++`
Operating Systems	Linux, MacOS
Parallel Computing	OpenMP, MPI, CUDA
Typesetting	LaTeX, Markdown