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

EDUCATION

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

GENERAL RESEARCH INTERESTS

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

RESEARCH EXPERIENCES

Graduate Student Researcher in FIRE Simulation Project Jul. 2022—Present
Prof. Dušan Kereš and FIRE collaboration *UCSD*

· Participated in the collaboration of Feedback in Realistic Environments (FIRE) simulation project
· Analyzed impacts of different transport models of cosmic rays (CR) on the evolution of galaxies and the properties of CGM
· Studied the evolution of (both galactic and circumgalactic) magnetic fields in FIRE simulations, focusing on the seeding and amplification mechanisms

Intergalactic Filaments in Simulation Nov. 2020—Apr. 2023
Prof. Nir Mandelker, Prof. S. Peng Oh *UCSB, KITP[1], HUJI[2]*

· Analyzed data from an enhanced resolution simulation adapting N-body + magnetohydrodynamics code (`AREPO`)
· Unveiled thermodynamical properties of the filaments by stacking filament slices and fitting them to isothermal models
· Studied the dynamics of the filaments by calculating different mass contributions using the modified summation method
· Studied the behaviour of the cold stream when penetrating the strong shock surrounding the halo and used it as a poster-child for further idealized simulations

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

· Disproved several hypotheses about the origin of the $m = 2$ nonaxisymmetric anomaly on an AGN disk from a simulation, including the Rossby wave instabilities, the vorticity evolution, and the spiral density wave

[1]Kavli Institute of Theoretical Physics
[2]The Hebrew University of Jerusalem

- Visualized the ring-like structure in 3D and studied more about its origin by calculating the angular momentum of the disk
- Proposed new MHD simulations with longer run time to figure out the destination of the ring

PUBLICATIONS

Lu, Y.S. and Kereš, D. et al. "Constraining cosmic-ray models in FIRE simulations using basic circumgalactic medium properties", in prep, 2024

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", MNRAS, 527, 11256

CONFERENCES AND TALKS

Santa Cruz Galaxy Workshops Invited talks
2023 (video), 2024 (video)
UC Santa Cruz, Santa Cruz, CA, USA

Galaxy Formation and Evolution in Southern California (GalFRESCA) Contributed talk
Sep 2024
Carnegie Observatories, Pasadena, 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 Contributed talk
Sep 2021 (video)
KITP & UCSB, online

TEACHING EXPERIENCES

UCSD Physics 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 2A:** mechanics (aimed for engineering students)
- **PHYS 2B:** electromagnetism (aimed for engineering students)
- **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)

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

SELECTED COURSEWORKS

Graduate Courses: High Energy Astrophysics, Galactic Dynamics, Interstellar Medium, Stellar Physics, Astrophysical Fluid Dynamics, Parallel Computing, Emergent States of Matter, Statistics, Data Analysis and Machine Learning for Physicists
Independent Studies: Differential Geometry and Manifold Theory with Applications in General Relativity (with Dr. Jiayin Pan at UCSB)

ACADEMIC SERVICE / OUTREACH

UCSD Department of Astronomy and Astrophysics Fall 2023-present
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