YUE SAMUEL LU

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EDUCATION

• **University of California, San Diego (UCSD)** Sep. 2022—Present
Ph.D. in ***Physics*** with an ***astrophysics*** emphasize
Current GPA: 3.90/4.00

• **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
C/IGM, Large-scale Structures, Compact Object Accretion, Cosmic Rays, Numerical Simulations

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)

RESEARCH EXPERIENCES

FIRE Simulation July. 2022—Present
Prof. Dušan Kereš *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
· Reran some of the low-res simulations with CR transport models whose validity has been tested

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 Jun. 2021—Jun. 2022
Prof. Omer Blaes *UCSB*

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

- 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
- 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

Yue Samuel Lu, Nir Mandelker, S. Peng Oh, Avishai Dekel, Frank C. van den Bosch, Volker Springel, Daisuke Nagai, Freeke van de Voort (2023), "The Structure and Dynamics of Massive High-z Cosmic-Web Filaments: Three Radial Zones in Filament Cross-Sections", submitted (ADS)

TALKS

Samuel Lu (2021), "Resolving High-redshift Cosmic Filaments", KITP Undergraduate Physics Research Symposium, UC Santa Barbara (video recording)

TEACHING / GRADING EXPERIENCES

UCSD Physics Department Fall 2022—present
Teaching Assistant

Ran discussion sections for undergraduate level physics courses. Graded homework assignments and/or exams

UCSB Campus Learning Assistance Services (CLAS) Sep. 2020—Jun. 2021
Math, Physics and Engineering Tutor

Taught lower division math and physics courses. Ran group tutorials and drop-in sessions

UCSB Physics Department Multiple Quarters
Learning Assistant and Grader

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

SKILLS

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