

Shalini Kurinchi-Vendhan

computational astrophysics • galaxies and black holes • science education



Pasadena, California



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skurinch.github.io/astrolit

Astrophysical simulations tell a story by allowing us to picture how the Universe and its galaxies came to be. Similarly, I always endeavor to create a narrative about my research that can reach a wide audience.

skills: data analysis and numerical methods • scientific programming • research design • presenting scientific results • science writing and storytelling • outreach and mentoring • international collaborations

Education

2024 – 2025

Heidelberg,
Germany

Heidelberg University – Institute for Theoretical Astrophysics

Advised by Dr. Annalisa Pillepich

MASTER OF SCIENCE IN PHYSICS

2019 – 2023

Pasadena,
California

California Institute of Technology

Advised by Professor Philip F. Hopkins

BACHELOR OF SCIENCE IN ASTROPHYSICS

Cosmology · Stars · Interstellar Medium · High-Energy Astrophysics · Structure and Dynamics of Galaxies · Radiative Processes · Discrete Mathematics · Feedback Control Systems · Mathematical Chaos · Methods of Computational Mathematics · Mathematical Methods of Physics · Computational Physics

BACHELOR OF SCIENCE IN ENGLISH LITERATURE

American Modernism · Novels of Education · Russian Literature · Poetry Writing · 19th Century British Literature · Premodern Literature · Writing in Astronomy · History of Books · Fiction Writing · Journalism & Storytelling

2015 – 2019

Rockaway,
New Jersey

Morris Hills High School | Magnet Program for Mathematics & Science

Graduated as the valedictorian. Took courses in research and data analysis and completed an independent research project as part of the program.

Research Experience

2023 – 2024

Heidelberg,
Germany

Max Planck Institute for Astronomy

Advised by Dr. Annalisa Pillepich

U.S FULBRIGHT SCHOLARSHIP

Supermassive Black Holes and Dense Environments in IllustrisTNG Jellyfish Galaxies.

- 2019 – 2023 **Caltech (TAPIR) Theoretical AstroPhysics Including Relativity and Cosmology**
Pasadena, California
Advised by Professor Philip F. Hopkins
 The Evolution of Galaxies and Supermassive Black Holes in Cosmological Simulations.
- 2022 – 2023 **École Polytechnique Fédérale de Lausanne**
Lausanne, Switzerland
Advised by Professor Michaela Hirschmann
 The Origin of Star Formation Quenching in Early, Massive Galaxies with IllustrisTNG.
- Summer 2022 **Harvard & Smithsonian Center for Astrophysics**
Cambridge, Massachusetts
Advised by Dr. Francesca Civano and Dr. Laura Brenneman
SAMUEL N. VODOPIA AND CAROL J. HASSON FELLOWSHIP
 Constraining Supermassive Black Hole Accretion with the *Chandra* X-Ray Telescope.
- Summer 2021 **Carnegie Observatories – Theoretical Astrophysics Center**
Pasadena, California
Advised by Dr. Andrew Benson
CARNEGIE ASTROPHYSICS SUMMER STUDENT INTERNSHIP
 Spherical Collapse of Dark Matter Halos with 3-D Numerical Simulations and the Semi-Analytic Code *Galacticus*.
- Summer 2020 **Niels Bohr Institute – Dark Cosmology Center**
Copenhagen, Denmark
Advised by Dr. Michaela Hirschmann
CALTECH SUMMER UNDERGRADUATE RESEARCH FELLOWSHIP
 The Role of AGN in Star Formation Quenching in Nearby Dwarf Galaxies in IllustrisTNG with Synthetic Emission Line Models.
- Summer 2018 **Summer Science Program in Astrophysics**
Socorro, New Mexico
Advised by Professor Adam Rengstorf and Professor William Andersen
COMPETITIVE HIGH SCHOOL SUMMER PROGRAM
 Predicted the orbit of a potentially hazardous near-Earth asteroid with research-grade telescope and numerical simulations.

Publications

- 2024 Shalini Kurinchi-Vendhan, Marion Farcy, Michaela Hirschmann, Francesco Valentino, **On the origin of star formation quenching in massive galaxies at $z \gtrsim 3$ in the cosmological simulations IllustrisTNG**, [*Monthly Notices of the Royal Astronomical Society*, Volume 534, Issue 4, November 2024, Pages 3974–3988](#), arXiv:2310.03083
- 2023 Philip F Hopkins, Alexander B Gurvich, Xuejian Shen, Zachary Hafen, Michael Y Grudić, Shalini Kurinchi-Vendhan, et al. **What causes the formation of discs and end of bursty star formation?**, [*Monthly Notices of the Royal Astronomical Society*, Volume 525, Issue 2, October 2023, Pages 2241–2286](#), arXiv:2301.08263

Presentations + Talks

2024 <i>Pisa, Italy</i>	The Physical Processes Shaping the Stellar and Gaseous Histories of Galaxies POSTER PRESENTATION + FLASH TALK Star Formation, Quenching, and AGN Activity in IllustrisTNG at High Redshifts and in Dense Environments
2023 <i>Seattle, Washington</i>	American Astronomical Society Meeting 241 CHAMBLISS MEDAL-WINNING POSTER The Role of Black Hole Feedback in Quenching Simulated Dwarf Galaxies
2022 <i>Malibu, California</i>	Southern California Conference in Undergraduate Research INVITED TALK Connecting Galaxy Evolution to Black Hole Spin with the <i>Chandra</i> X-Ray Telescope
2021 <i>Pasadena, California</i>	American Astronomical Society Meeting 240 POSTER SESSION The Spherical Collapse of Fuzzy Dark Matter in 3-D Simulations
2020 – 2022 <i>Pasadena, California</i>	Caltech Summer Undergraduate Research Fellowship Seminar Day PRIZE-WINNING TALKS The Spherical Collapse of Fuzzy Dark Matter in 3-D Simulations Connecting Galaxy Evolution to Black Hole Spin with the <i>Chandra</i> X-Ray Telescope Black Holes and the Death of Galaxies: An Exploration with Simulations

Fellowships + Awards

2023 <i>International</i>	U.S. Fulbright Scholarship – Research/Study Award to Germany Extremely prestigious grant for scholars, journalists, and students to engage in year-long research projects and cultural diplomacy abroad.
2023 <i>National</i>	National Science Foundation Graduate Research Fellowship Program Awarded, but declined. Competitive five-year fellowship that provides financial support to outstanding graduate students who have demonstrated the potential to be high-achieving scientists.
2023 <i>National</i>	AAS Chambliss Astronomy Achievement Student Award Medal awarded for presenting exemplary research at the poster session of the American Astronomical Society meeting, among thousands of students.
2023 <i>Academic</i>	Paul Studenski Memorial Prize Travel award to England to study the history and literature of early-modern female writers, work on creative writing projects, and explore passions outside of science.

2022 <i>Academic</i>	Samuel N. Vodopia and Carol J. Hasson SURF Fellowship Named fellow for designing an outstanding summer research proposal.
2022 <i>Academic</i>	Margie Lauritsen Leighton Prize Presented to a Caltech undergraduate woman in physics/astronomy for academic excellence and leadership based on faculty nominations.
2022 <i>Academic</i>	Hallett Smith Prize in Literature Outstanding critical essay: “ <i>Middlemarch</i> by George Eliot: Dorothea the Dryad.”
2021 <i>Academic</i>	Doris S. Perpall Speaking Award – 2nd Place Selected from over 250 students for presenting research on Caltech’s SURF Seminar Day, for excellence in communication skills. <i>Semi-finalist in 2020 and finalist in 2022.</i>

Teaching

2023 <i>Pasadena, California</i>	Physics Teaching Assistant WAVES, QUANTUM PHYSICS, AND STATISTICAL MECHANICS Lead office hours and marked problem sets for a core curriculum physics class of +100 students in their second year of studies.
2020 – 2023 <i>Pasadena, California</i>	Hixon Writing Center PEER TUTOR IN ACADEMIC WRITING Lead small group workshops and one-to-one meetings with students to help improve their writing across humanities and STEM disciplines.

Science Communication + Outreach

<i>New!</i>	astropoetry Blog Concept for a web-magazine about the connections between science, art and poetry. Featuring original writing and art related to the Universe.
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Projects completed as a Fulbright Scholar in Germany...

2024	Astronomy at the German-American Institute in Heidelberg Gave lectures about introductory astronomy for pre-school and higher-level kids. Organized a weekly “ Out of This World! ” children’s library storytime program for international families, with space-themed picture books and crafts.
2024	Reach-the-World Science Travel Diaries Shared my experiences as an astronomer traveling in Europe with a 3 rd grade special-education classroom in New York City through writing articles for a blog and organizing weekly video conferences.

- 2024 **How Do the Tails of Jellyfish Galaxies Form? STRUCTURES Blog Post**
Collaborated on a [science education article](#) for a physical sciences magazine.
- 2024 **Meet US**
Lead classroom discussions about culture and education in the United States at a vocational school for women near Frankfurt.
- 2024 **Science in School Editor**
Collaborated with teachers to write articles about topics in astronomy as an editor for the European journal for science teachers.

Outreach efforts at Caltech...

- 2022 **Theater Production at the Festival of Wonder**
Co-wrote a play about “The Feminist Birth of Climate Science,” in collaboration with the University of Trento. Performed for the public at the Museo delle Scienze in Italy.
- 2021 – 2023 **Reading Partners of Los Angeles**
Worked one-to-one with K-4th grade students who are behind grade-level to teach literacy skills and encourage life-long confidence in reading.
- 2019 – 2023 **Storytelling for Scientists**
Performed [narratives about my passion for science](#) with the Los Angeles community, including “The Feminine Mystique in Astronomy” and “Saturn and Desert Mice.”