Shalini Kurinchi-Vendhan

computational astrophysics • galaxies and black holes • science writing

Heidelberg, Germany | skurinch@alumni.caltech.edu | 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.

scientific programming • communicating scientific results • international research collaborations • formulating and investigating research questions in detail • interdisciplinary and approaches to science

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 *Pasadena, California*

Caltech (TAPIR) Theoretical AstroPhysics Including Relativity and Cosmology

Advised by Professor Philip F. Hopkins

The evolution of galaxies and supermassive black holes in state-of-the-art

2022 – 2023 *Lausanne, Switzerland*

École Polytechnique Fédérale de Lausanne

Advised by Professor Michaela Hirschmann

The Origin of Star Formation Quenching in Early, Massive Galaxies with IllustrisTNG.

Summer 2022 *Cambridge, Massachusetts*

Harvard & Smithsonian Center for Astrophysics

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 *Pasadena, California*

Carnegie Observatories – Theoretical Astrophysics Center

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 *Copenhagen, Denmark*

Niels Bohr Institute – Dark Cosmology Center

Advised by Dr. Michaela Hirschmann

CALTECH SUMMER UNDERGRADUATE RESEEARCH FELLOWSHIP

The Role of AGN in Star Formation Quenching in Nearby Dwarf Galaxies in IllustrisTNG with Synthetic Emission Line Models.

Summer 2018 *Socorro, New Mexico*

Summer Science Program in Astrophysics

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 ≳ 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 and Talks

2024 — *Socorro, New Mexico*

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 — *Seattle, Washington*

American Astronomical Society Meeting 241

CHAMBLISS MEDAL-WINNING POSTER

The Role of Black Hole Feedback in Quenching Simulated Dwarf Galaxies

2022 — *Malibu, California*

Southern California Conference in Undergraduate Research

INVITED TALK

Connecting Galaxy Evolution to Black Hole Spin with the *Chandra* X-Ray Telescope

2021 — *Pasadena, California*

American Astronomical Society Meeting 240

POSTER SESSION

The Spherical Collapse of Fuzzy Dark Matter in 3-D Simulations

2020 – 2022 — *Pasadena, California*

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 *Chandra* X-Ray Telescope

Black Holes and the Death of Galaxies: An Exploration with Simulations

Fellowships & Awards

2023 — *International*

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 — *National*

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 — *National*

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 — *Institution*

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 — *Institution*

Samuel N. Vodopia and Carol J. Hasson SURF Fellowship

Named fellow for designing an outstanding summer research proposal.

2022 — *Institution*

Margie Lauritsen Leighton Prize

Presented to a Caltech undergraduate woman in physics/astronomy for academic excellence and leadership based on faculty nominations.

2022 — *Institution*

Hallett Smith Prize in Literature

Outstanding critical essay: "*Middlemarch* by George Eliot: Dorothea the Dryad."

2021 — *Institution*

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. *Semi-finalist in 2020 and finalist in 2022.*

Teaching

2023 — *Pasadena, California*

Physics Teaching Assistant

WAVES, QUANTUM PHYSICS, AND STATISTICAL MECHANICS

Led office hours and marked problem sets for a core curriculum physics class of +100 students in their second year of studies.

2020 – 2023 — *Pasadena, California*

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

New!

astropoetry Blog

Concept for a web-magazine about the connections between science, art and poetry. Featuring original writing and art related to the Universe.

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 3rd 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 the 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 and article about topics in astronomy as an editor for a 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."