James Sunseri

Astrophysics Graduate Student

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Education

Princeton University — Princeton, NJ
Hertz Fellow
Ph.D. Astrophysical Sciences — *Expected 2028*
M.S. Astrophysical Sciences — *Expected 2025*

University of California Berkeley — Berkeley, CA
B.A. Physics; B.A. Astrophysics with High Distinction | Advisors: Prof. Alex Filippenko, Prof. Jia Liu, Prof. Zachary Slepian — *2022*

Research Interests

- Implications of baryonic feedback on cosmology
- Magnetohydrodynamical simulations of high-energy astrophysical phenomena
- Higher-order statistics and N-Point Correlation Functions
- Machine learning and generative models
- Efficient algorithm design for large datasets

Positions

Visiting Student Researcher, Kavli IPMU — Kashiwanoha, Japan
The Effects of Massive Neutrinos and Dark Energy on the Cosmic Web | Advisor: Prof. Jia Liu — *2023*

Student Researcher, UC Berkeley — Berkeley, CA
Transient Based Observational Astronomy | Advisor: Prof. Alex Filippenko — *2018 - 2022*

Student Researcher, University of Florida — Remote
SARABANDE: a python package for measuring 3/4 PCFs with FFTs | Advisor: Prof. Zack Slepian — *2021 - 2023*

Student Researcher, University of Tokyo — Remote
The Effects of Baryonic Feedback on the Cosmic Web | Advisor: Prof. Jia Liu — *2020 - 2023*

NSF Summer Research Experience for Undergraduates, University of Florida — Gainesville, FL
Fast Four Point Statistics of Turbulence in the Interstellar Medium | Advisor: Prof. Zack Slepian — *2021*

LIGO Summer Undergraduate Research Fellowship, Caltech — Pasadena, CA
Measuring The Hubble Constant With Dynamical Tides In Inspiraling Neutron Star Binaries | Advisor: Dr. Hang Yu — *2020*

Publications

1. Ailawadhi, B.; Dastidar, R.; Misra, K.; Roy, R.; *et al.* (33 other co-authors, incl. **Sunseri, James**), 2023, *Photometric and spectroscopic analysis of the Type II SN 2020jfo with a short plateau*, MNRAS, **519**, 248 (arXiv:2211.02823) [7 citations]
2. **Sunseri, James**; Li, Zack; & Liu, Jia, 2023, *Effects of baryonic feedback on the cosmic web*, Physical Review D, **107**, 23514 (arXiv:2212.05927) [9 citations]
3. **Sunseri, James**; Slepian, Zachary; Portillo, Stephen; Hou, Jiamin; *et al.*, 2023, *SARABANDE: 3/4 point correlation functions with fast Fourier transforms*, RAS Techniques and Instruments, **2**, 62 (arXiv:2210.10206) [4 citations]
4. Murakami, Yukei S.; Jennings, Connor; Hoffman, Andrew M.; Savel, Arjun B.; *et al.* (6 other co-authors, incl. **Sunseri, James**), 2022, *PIPS, an advanced platform for period detection in time series - I. Fourier-likelihood periodogram and application to RR Lyrae stars*, MNRAS, **514**, 4489 (arXiv:2107.14223) [2 citations]
5. Zheng, WeiKang; Stahl, Benjamin E.; de Jaeger, Thomas; Filippenko, Alexei V.; *et al.* (84 other co-authors, incl. **Sunseri, James**), 2022, *The Lick Observatory Supernova Search follow-up program: photometry data release of 70 SESNe*, MNRAS, **512**, 3195 (arXiv:2203.05596) [8 citations]
6. Kilpatrick, Charles D.; Coulter, David A.; Arcavi, Iair; Brink, Thomas G.; *et al.* (79 other co-authors, incl. **Sunseri, James**), 2021, *The Gravity Collective: A Search for the Electromagnetic Counterpart to the Neutron Star-Black Hole Merger GW190814*, ApJ, **923**, 258 (arXiv:2106.06897) [22 citations]

Posters & Research Talks

- **The Effects of Baryons on the Cosmic Web**: Kavli IPMU, Chiba University, University of Tokyo, Nagoya University - 2023 [Slides]
- **LIGO SURF Caltech Summer Talk**: Presented my research to fellow SURF participants, LIGO research scientists, and mentors of the program.
- **237th American Astronomical Society Meeting iPoster Presentation**: Presented a research project via iPoster about gravitational wave cosmology I had done over summer in the LIGO SURF Program. (Featured on AstroBites)
- **238th American Astronomical Society Meeting iPoster+ Presentation**: Our group presented a research project via iPoster+ on a new four band photometry approach of measuring the temperature of variable stars over a period cycle.

Outreach

TEDxAustin Youth Austin, TX
Guest Speaker, "The Essential Skill You Can't Afford To Ignore In Today's Digital World *Spring 2023*

World of Wonders Science Museum Lodi, CA
The local science museum of the San-Joaquin County *Summer 2017 - Present*

- Co-wrote and Wrote 5 lessons for the WOW Education Programming. *Art of Alchemy, Narrowing on Newton, Solar System and Beyond II, What is Gravity, and Lunar School* and compiled 80+ Lessons for summer camps
- Helped plan and teach several summer camps for the past few years. *Astronaut Training, Science Wizards, Science Detectives, Terrific Tinkering, etc...*
- Trained to operate Lodi Unified School District's portable planetarium known as the StarLab
- Taught several Lunar School lessons for the WOW during the Apollo 11 50th Anniversary
- Helped teach with the outreach program for the WOW known as WOW on Wheels and helped run both Forensics and Astronaut Camps
- In the promotional video for the huge future expansion of the WOW
- Successfully taught two lessons at the local middle school during my senior year of high school
- Was on the news network known as Good Day Sacramento for the WOW Museum to celebrate the Apollo 11 50th Anniversary

SPLASH at UC Berkeley Berkeley, CA
student led High School outreach program at UC Berkeley *Spring 2021*

- **Video Games & Simulations 101**: A talk where I teach high school students the basics of Python and walk through how to build a video game using only Python followed by a discussion of how it all relates to Astrophysical Simulations in research.

Teaching

Head Undergraduate Student Instructor for Astro C10 Berkeley, CA
Astro C10 - Introduction to Astronomy *Fall 2022*

- I am the first undergrad to be the head student instructor that oversees the logistics of the Introduction to Astronomy course at UC Berkeley containing 900+ students. In this role I teach students, plan the logistics for the entire course, and oversee other student instructors and graders for the course.

Undergraduate Student Instructor for Astro C10 Berkeley, CA
Astro C10 - Introduction to Astronomy *Fall 2020*

- I was a UGSI for the Introduction to Astronomy course taught by Professor Alex Filippenko at UC Berkeley. I taught 4 sections, hosted office hours, prepared lessons and quizzes, and proctored exams

Head Facilitator for the Python Decal: Astro 98 Berkeley, CA
Python Decal - Introduction to Computational Methods for Astronomers *Fall 2020 - Present*

- As head facilitator for this course I have planned the entire course with the help of other facilitators, developed the curriculum, given lectures, hosted office hours, and assigned and graded homework and projects. I also secured funding to pay the course staff and interns with the funds of the Berkeley Discover grant.

Mentorship

ULAB Research Mentor: Numerical Spin Analysis of Relativistic Bondi Accretion in M87* Berkeley, CA
ULAB - Undergraduate Laboratory at Berkeley *Fall 2021 - Spring 2022*

- I mentored a group of undergraduate students to complete a year long research project where they explored the effects of black hole spin on relativistic Bondi Accretion for a simple model of M87*. In this project I taught basic fundamentals of relativity and computational hydrodynamics. Their poster can be found here.

UC Berkeley Compass Mentor Berkeley, CA
Served as a mentor for a younger undergraduate student *Spring 2021*

Berkeley High School RISE Mentor Berkeley, CA
A tutor and mentor to struggling high school students from underprivileged families *Fall 2018 - Spring 2020*

Skills & Assets

- **Programming Languages**: Python, UNIX, Julia, Java, C++, HTML, Javascript, CSS
- **Clusters**: **Anvil** Rosen Center for Advanced Computing, **HiPerGator3.0** at University of Florida, **Savio** at UC Berkeley
- **Astrophysical Simulation Codes**: Athena++, Modules for Experiments in Astrophysics (MESA)
- **Technologies**: GitHub, SLURM, OpenMP, MPI, Adobe Illustrator, Adobe Photoshop, Adobe Premier Pro, Microsoft Office Programs, Google Drive
- **Libraries**: Numpy, Scipy, Pandas, astropy, yt, H5py, Jupyter, PyGame, MatPlotlib, ffmpeg
- **Languages**: English, French

Awards

- Fannie and John Hertz Foundation Fellowship
- Department of Energy Computational Science Graduate Research Fellowship (DOE CSGF) - (***Declined***)
- Outstanding (U)GSI Teaching Award
- Chambliss Award for Best Research Poster at 238th AAS Meeting (shared)
- Recipient of the Northern California Scholarship Foundations Award
- Q728 Lui, P & Chang, J Phys Scholarship
- Berkeley Scholarship
- 7 Separate Astronomy Departmental Scholarships for Teaching
- Ehrman, Albert Scholarship
- Berkeley CARES Award
- Edward Frank Kraft Award

Extracurriculars

- Undergraduate Student Representative for the Astronomy Department at UC Berkeley
- Undergraduate Peer Advisor for the Astronomy Department at UC Berkeley
- Camp Kesem Berkeley Counselor, Unit Leader, and Program Coordinator
- Society of Physics Students member
- Undergraduate Astronomy Society member
- Member of the Cercle de Français at UC Berkeley