

# Orion S. Ning

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## 🏛️ EDUCATION

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**The University of California, Berkeley**

*Ph.D. Physics, NSF Graduate Research Fellow*

Berkeley, CA

2022 –

**The University of California, Berkeley**

*B.A. Physics (Highest Honors), Mathematics (High Honors)*

*M.A. Physics*

Berkeley, CA

2022

2024

## ⚙️ RESEARCH INTERESTS

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Dark Matter Phenomenology and Detection, Axions, Astrophysics/Astroparticle Physics, Computational Methods, Quantum Field Theory

## 📖 RESEARCH

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**Dark Matter Indirect Detection and Phenomenology**

*Advisor: Benjamin R. Safdi*

*Funding: NSF Graduate Research Fellow*

2022 –

*UC Berkeley, and LBNL*

## 📚 PUBLICATIONS

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[INSPIRE](#) | 

1. Ellis, S. A. R., **Ning, O.**, Rodd, N. L., & Schütte-Engel, J. (2026). Crowdsourcing Gravitational Waves from Superradiant Axions. [arXiv:2603.15734](#).
2. De Marchi, A. G., **Ning, O.**, & Xiao, T. (2026). Blazar Constraints on Axions through New Spectral Modulation Searches in 1ES 1959+650 & B2 1811+31. [arXiv:2603.13480](#).
3. **Ning, O.**, Raman, K., & Safdi, B. R. (2025). Cosmological Neutron Stars Produce Diffuse Axion X-Ray Signatures. [arXiv:2512.15849](#).
4. **Ning, O.**, Ray, A., & Safdi, B. R. (2025). Axion lines from nuclear de-excitations in galactic stellar populations. *Phys.Rev.D* 113 (2026) 3, 035010 [arXiv:2509.03569](#).
5. **Ning, O.**, & Safdi, B. R. (2025). Probing the Axion-Electron Coupling with NuSTAR Observations of Galaxies. *Phys.Rev.D* 113 (2026) 1, 015021 [arXiv:2503.09682](#).
6. **Ning, O.**, Dessert, C., Hong, V., & Safdi, B. R. (2024). Search for Axions from Magnetic White Dwarfs with Chandra. *Phys.Rev.D* 111 (2025) 10, 103002 [arXiv:2411.05041](#).
7. **Ning, O.**, & Safdi, B. R. (2024). Leading Axion-Photon Sensitivity with NuSTAR Observations of M82 and M87. *Phys.Rev.Lett.* 134 (2025) 17, 171003 **Editor's Suggestion**, [arXiv:2404.14476](#).
8. Dessert, C., **Ning, O.**, Rodd, N. L., & Safdi, B. R. (2023). Resurrecting Hitomi for Decaying Dark Matter and Forecasting Leading Sensitivity for XRISM. *Phys.Rev.Lett.* 132 (2024) 21, 211002 [arXiv:2305.17160](#).
9. Mu2e-II Collaboration (including **Ning, O.**) (2022). Mu2e-II: Muon to electron conversion with PIP-II. *In Snowmass 2021*. [arXiv:2203.07569](#).
10. Garcia-Quintero, C., Ishak, M., & **Ning, O.** (2020). Current constraints on deviations from General Relativity using binning in redshift and scale. *JCAP*, 12, 018. [arXiv:2010.12519](#).

## 🗨️ SELECTED PRESENTATIONS, TALKS, AND POSTER SESSIONS

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- “Dark Particles and Bright Bursts: Future Stories from the Gamma-Ray Sky with GALAXIS,” COST WG3 (WISPs in Astrophysics) Monthly Meeting, *online, April 2026*
- “Dark Particles and Bright Bursts: Future Stories from the Gamma-Ray Sky with GALAXIS,” LBL Dark Matter Lunch Talk, *Berkeley, CA, April 2026*
- “Galactic Axion Factories: Astrophysical Populations and Signals for Axion Searches,” Stanford KIPAC Seminar, *Stanford, CA, March 2026*
- “Galactic Axion Factories: Stellar Populations and X-Ray Signals for Axion Searches,” SLAC Theory Seminar, *Stanford, CA, October 2025*
- “Dark Particles and Bright Bursts: Future Stories from the Gamma-Ray Sky with GALAXIS,” UC Berkeley Astrophysics Department Lunch Talk, *Berkeley, CA, October 2025*
- “Galactic Axion Factories: Stellar Populations and X-Ray Signals for Axion Searches,” Axions in Stockholm 2025, *Stockholm, Sweden, July 2025*
- “Galactic Axion Factories: Stellar Populations and X-Ray Signals for Axion Searches,” The Strong CP Problem and its Possible Solutions 2025, *Pollica, Italy, June 2025*
- “Galactic Axion Factories: Stellar Populations and X-Ray Signals for Axion Searches,” Berkeley 4D Seminar, *Berkeley, CA, April 2025*
- “Axion-Photon Sensitivity with NuSTAR Observations of M82 and M87,” TeVPA 2024, *Chicago, IL, August 2024*
- “Axion-Photon Sensitivity with NuSTAR Observations of M82 and M87,” DPF-PHENO 2024, *Pittsburgh, PA, May 2024*
- “Resurrecting Hitomi for X-ray Probes of Sterile Neutrino and Axion-Like-Particle Dark Matter with Blank Sky Observations,” PASCOS 2023, *Irvine, CA, June 2023*
- “Compactification of a Nonlocal 6D Quantum Field Theory Toward Exploring Anomalies,” UC Berkeley Summer Undergraduate Research Fellowship (SURF) Conference, *Berkeley, CA, August 2021*

## 👤 TEACHING AND TUTORING

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### Teaching Assistantships (GSI)

- Physics 110B: Classical Electrodynamics Part II (*instructor: Liang Dai*) ..... Fall 2023

### Democratic Education at Cal (DeCal) | *Lead Course Facilitator and Teacher*

[site](#)

- Astronomy 98: Beginner’s Guide to the Universe (*faculty sponsor: Jessica Lu*) ..... Fall 2020 – Spring 2022

### Department Peer Tutor and Group Study Facilitator | *Physics Department*

[site](#)

- Physics 137A (Quantum Mechanics I) ..... Spring 2022
- Physics 110A (Electromagnetism and Optics I) ..... Fall 2021
- Physics 137B (Quantum Mechanics II) ..... Spring 2021, Fall 2020

### Course Reader/Grader

- Physics 209: Classical Electromagnetism (Graduate Level) (*instructor: Liang Dai*) ..... Fall 2024
- Physics 137A: Quantum Mechanics I (*instructor: Swapan Chatterjee*) ..... Summer 2023
- Physics 110B: Classical Electrodynamics Part II (*instructor: Ehud Altman*) ..... Spring 2022
- Physics 112: Statistical Mechanics/Thermodynamics (*instructors: Michael Zaletel, Ehud Altman*) ..... Fall 2021

- Physics 137A: Quantum Mechanics I (*instructor: Dan Kasen*) .....Spring 2021
- Physics 77: Introduction to Computational Techniques in Physics (*instructor: Yury Kolomensky*) ..... Fall 2020
- Math 54: Linear Algebra and Differential Equations (*instructor: Rui Wang*) .....Summer 2020

**Pedagogy Theory** | *Courses Taken*

- MPS 375: Pedagogy in Math and the Physical Sciences .....Spring 2023
- Student Learning Center (SLC) Astronomy and Physics Pedagogy Seminar ..... Fall 2021 – Spring 2022

 **OUTREACH, SERVICE, AND MENTORING**

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**Berkeley Center for Theoretical Physics 4D Seminar** [site](#)

- Organizer .....Spring 2026

**Astronomy on Tap San Francisco** [site](#)

- Speaker, “From Astrophysics to Axions: The Glorious Hunt for Dark Matter” (Dec. 9) ..... Fall 2025

**UC Berkeley Compass Lectures** [site](#)

- Speaker, “The Cosmic Game of Hide-and-Seek: Chasing Dark Matter Across the Stars” (Apr. 18) ....Spring 2025

**UC Berkeley Astro Night Public Lecture** [site](#)

- Speaker, “From Astrophysics to Axions: The Glorious Hunt for Dark Matter” (Oct. 3) .....Fall 2024

**Splash at Berkeley** | *Administrator and Volunteer Teacher* [site](#)

- Administrator and Organizer .....Spring 2024 –
- Class S1663: Cosmic Ghostbusters: Hunting the Universe’s Invisible Beasts (*joint with Hannah Lykes*) Spring 2026
- Class S1570: Good Vibrations: Gravitational Waves and the Hidden Music of Spacetime ..... Fall 2025
- Class S1469: The Usual (Particle) Suspects: Culprits Beyond the Standard Model? ..... Spring 2025
- Class S1241: From Astrophysics to Axions: The Glorious Hunt for Dark Matter ..... Spring 2024, Fall 2024
- Class S919: So Long, and Thanks for All the Spacetime (*joint with Druv Punjabi*) ..... Spring 2022
- Class S838: Alge-cada-bra: The Algebraist’s Answer to Life, the Universe, and Everything (*joint with Ryan Tamura*) .....Fall 2021
- Rainstorm Virtual Class S732: The Quantum Complex (*joint with Ryan Tamura*) .....Spring 2021
- Class S772: The Quantum Complex (*joint with Ryan Tamura*) .....Spring 2021
- Class S667: Relativity and Spacetime ..... Fall 2020

**Science Olympiad**

- Science Olympiad at Berkeley: Exam Writer, Moderator, Grader – Solar System ..... Spring 2026, [site](#)
- Golden Gate Science Olympiad: Volunteer, Moderator & Grader – Astronomy .....Spring 2025, [site](#)

**UC Berkeley Major Curriculum Committee**

- Graduate Representative ..... Fall 2022 – Spring 2023
- Undergraduate Representative ..... Fall 2021 – Spring 2022

**MPS Scholars Mentoring Network** | *Volunteer Mentor* [site](#)

- Mentor ..... Fall 2025 –

**Berkeley Undergraduate Mathementoring Program (BUMP)** | *Volunteer Mentor* [site](#)

- Mentor ..... Fall 2019 – Fall 2021

**Society of Physics Students (SPS) Mentoring Program** | *Volunteer Mentor* [site](#)

- Mentor ..... Fall 2020 – Spring 2022

## AWARDS, HONORS, AND FUNDING

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- Sushant Singh Rajput Memorial Fellowship in Physics ..... 2025
- Hearts to Humanity Eternal (H2H8) Graduate Research Grant ([site](#)) ..... 2025
- Outstanding Graduate Student Instructor (OGSI) Award ([site](#)) ..... 2023 – 2024
- National Science Foundation Graduate Research Fellowship ([site](#)) ..... 2022 – 2025
- Percy Lionel Davis Award in Mathematics ([site](#)) ..... 2022
- Cal Alumni Association’s The Leadership Award and Scholarship ([site](#)) ..... 2021 – 2022, 2018 – 2019
- Astronaut Scholarship Foundation (ASF) Scholar ([site](#)) ..... 2021 – 2022
- UC Berkeley Summer Undergraduate Research Fellowship (SURF) ([site1](#)) ([site2](#)) ..... Summer 2021
- Berkeley Physics Undergraduate Research Scholars Program (BPURS) Funding ([site](#)) ... Fall 2020, Spring 2021
- UC Berkeley Kraft Award for Freshmen ([site](#)) ..... 2018

## TECHNICAL SKILLS

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**Languages and Software:** Python, C/C++, ROOT (CERN), Linux/Unix, BASH, cluster computing (slurm), Mathematica,  $\LaTeX$ , Git, MESA, NSCool, CAMB/CosmoMC, Geant4 toolkits, MEGAlib, Arduino, LabVIEW, Microsoft Office Suite

**Other:** Electronics and Circuitry, Soldering