WILLIAM DEROCCO

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EDUCATION

Stanford University, Stanford, CA; September 2016-September 2021.
Ph.D. in Physics • GPA: 4.05
Thesis: "Novel astrophysical signatures of Beyond the Standard Model physics."

Yale University, New Haven, CT; September 2012-May 2016
Bachelor of Science in Physics (Intensive) • GPA: 3.99 • Graduated summa cum laude
Awards: Howard L. Schultz Award for senior thesis (2016), Foundational Questions Institute "Show Me the Physics" video competition winner (2014)

CURRENT RESEARCH POSITIONS

University of Maryland/Johns Hopkins University, College Park, MD; Sept. 2024-present
Postdoctoral researcher; sponsored by Raman Sundrum, Ph.D. and Surjeet Rajendran, Ph.D.
Joint postdoctoral researcher between theoretical physics groups at both institutions, working on astrophysical probes of new physics.

NASA Goddard Spaceflight Center, Greenbelt, MD; Sept. 2024-present
Chair of the Roman Free-Floating Planet Working Group; sponsored by David Bennett, Ph.D.
Spearheading the search for free-floating planets with the upcoming Nancy Grace Roman Space Telescope for the Roman Galactic Exoplanet Survey Project Infrastructure Team (RGES-PIT).

PREVIOUSLY HELD POSITIONS

KEK, Tsukuba, Japan; Oct. 2023-Nov. 2023
Visiting QUP researcher; invited by V. Takhistov, Ph.D.

Santa Cruz Institute for Particle Physics, Santa Cruz, CA; Sept. 2021-Sept. 2024
Postdoctoral researcher; sponsored by S. Profumo, Ph.D.

Stanford Institute for Theoretical Physics, Stanford, CA; Sept. 2016-Sept. 2021
Graduate student; mentored by P. Graham, Ph.D

Yale University Physics Department, New Haven, CT; Sept. 2015-May 2016
Intern; mentored by G. Fleming, Ph.D

Fermi National Accelerator Laboratory, Batavia, IL; June 2015-Sept. 2015
Intern; mentored by B. Fleming, Ph.D

CERN, Geneva, Switzerland; June 2013-May 2015
Intern; mentored by T. Golling, Ph.D and T. Eifert, Ph.D

FELLOWSHIPS

Achievement Rewards for College Scientists (ARCS) Scholar Award; May 2020
Graduate fellow
Awarded by the Northern California chapter of the ARCS Foundation to senior graduate students with a record of past achievement and who show exceptional promise of making significant contributions to the scientific strength of the nation. Provides $48,000, full funding for the 2020-2021 academic year.

AWARDS & HONORS

Graduate Division Outstanding Postdoctoral Scholar Award; June 2023.
Awarded to a postdoctoral scholar at the University of California, Santa Cruz for demonstrating a strong original research program, leadership ability, effective mentorship of graduate students, and a commitment to outreach. $1500.

Paul H. Kirkpatrick Award; May 2020.
Awarded to a graduate student in the Stanford Physics Department for demonstrating a talent for and commitment to the teaching of physics to undergraduates. $1500.

TEACHING & MENTORING

PHYS499G: An Introduction to General Relativity, UMD, College Park; Jan. 2025, 2026.
Developed course materials for and taught a new three-week winter session course to upper-level undergraduate physics majors. Only postdoctoral-led course to be approved by department.

PHYS398: Independent Study, UMD, College Park; Sept. 2025-present.
Serving as mentor to undergraduate researchers pursuing projects in astronomy and theoretical physics. Role traditionally reserved for faculty members, granted an exception.

Sydney Spring School, Invited Lecturer, Sydney, Australia; Nov. 2022.
Delivered lectures to advanced graduate students on the overlap of stellar evolution and beyond the Standard Model Physics.

Polygence Mentor; March 2021-2023. Mentored five motivated high-school students in advanced extracurricular projects of their choosing; project under my mentorship received first place at 3rd Biannual Symposium of Rising Scholars.

Teaching Assistant, Stanford University; Apr. 2017-March 2020.
- *PHYSICS 43: Electricity and Magnetism*. Taught by M. Kasevich. Spr. 2017, Spr. 2018.
- *PHYSICS 61: Mechanics and Special Relativity*. Taught by P. Burchat. Aut. 2017.
- *PHYSICS 262: General Relativity*. Taught by P. Graham. Aut. 2018, Aut. 2019.
- *PHYSICS 41*: *Mechanics*. Taught by Y. Lee. Win. 2019, Win. 2020.

OUTREACH & ADVOCACY

Science on the Hill, Advocate, Washington, D.C.; Sep. 2025.
Led a delegation to meet with key congressional staffers and advocate for science-specific funding on Capitol Hill.

GRAD-MAP, Mentor, UMD, College Park; Jan. 2025.
Mentored undergraduate students from underserved institutions in one-week hands-on astronomy research program.

Santa Cruz Organization for Outreach in Physics, President; Oct. 2021-Aug. 2024.
Founded organization; lead outreach initiatives targeted at improving representation and public engagement within physics. Notable projects include: No Jargon Talks for the public, Physics Book Club at the local library, and establishing a dedicated mentorship space on campus.

Future Advancers of Science and Technology, San Jose, CA; Aug. 2017-May 2020.
Volunteered at underserved high school as a mentor to students developing year-long science projects; projects completed under my mentorship won first place at regional science fairs in 2019 and 2020.

PUBLICATIONS

Publications preceded by an asterisk (*) are still under review.

Lead Author

1. *Liu, Z., **DeRocco, W.**, Gottesman, D., et al. (2025). Measuring gravitational lensing time delays with quantum information processing. *Physical Review X*.
2. Kunimoto, M., **DeRocco, W**., Smyth, N., Bryson, S., & Gaudi, B. S. (2025). Searching for Free-Floating Planets with TESS: Results from a Search of Sector 61-65. *The Astronomical Journal, 170(6), 321*.
2. Smallwood, J., **DeRocco, W.**, Qin, Z., & Sefilian, A. (2025). The polar debris disc around 99 Herculis: A potential signpost for polar circumbinary planets. *MNRAS Letters*.
3. ***DeRocco, W.**, Zohrabi, F., Johnson, S., Penny, M. T., & McGill, P. (2025). Reconstructing the Free-floating Planet Mass Function with the Roman Space Telescope. *The Astronomical Journal*.
4. **DeRocco, W.** (2025). Dark wounds on icy moons: Ganymede's sub-surface ocean as a dark matter detector. *Physical Review D*.
5. **DeRocco, W.** & Giffin. P. (2025). Dark plasmas in the non-linear regime: constraints from particle-in-cell simulations. *Physical Review D, 111(9),* 095031.
6. Coleman, G. & **DeRocco, W.** (2025). Predicting the population of free-floating planets from realistic initial conditions. *MNRAS*, *537(3)*, 2303-2312.
7. **DeRocco, W.**, Smyth, N., & Takhistov, V. (2024). New light on dark extended lenses with the Roman Space Telescope. *Astrophysical Journal Letters, 965(1), L3*.
8. **DeRocco, W.**, Frangipane, E., Hamer, N., Profumo, S., & Smyth, N. (2023). Revealing terrestrial-mass primordial black holes with the Roman Space Telescope. *Physical Review D, 109(2),* 023013.
9. **DeRocco, W.**, Smyth, N., & Profumo, S. (2023). Constraints on sub-terrestrial free-floating planets from Subaru microlensing observations. *MNRAS, 527(3)*, 8921-30.
10. **DeRocco, W.** & Dror, J. (2024). Using pulsar parameter drifts to detect sub-nanohertz gravitational waves. *Physical Review Letters, 132(10),* 101403.
11. **DeRocco, W.** & Dror, J. (2023). Searching for stochastic gravitational waves below a nanohertz. *Physical Review D, 108(10),* 103011.
12. **DeRocco, W.**, Wegsman, S., Grefenstette, B., Huang, J., & Van Tilburg, K. (2022). First indirect detection constraints on axions in the solar basin. *Phys. Rev. Lett. 129(10),* 101101.
13. **DeRocco, W.**, Graham, P. W., & Kalia, S. (2021). Warming up cold inflation. *Journal of Cosmology and Astrophysics, 2021*(11), 11.
14. **DeRocco, W.**, Graham, P. W., & Rajendran, S. (2020). Exploring the robustness of stellar cooling constraints on light particles. *Physical Review D 102(7)*, 075015.
15. **DeRocco, W.**, Bollig, R., Graham, P. W., & Janka, H.-T. (2020). Muons in supernovae: implications for the axion-muon coupling. *Physical Review Letters 125(5),* 051104.
16. **DeRocco, W.**, & Graham, P. W. (2019). Constraining primordial black hole abundance with the Galactic 511 keV line. *Physical Review Letters*, *123*(25), 251102.
17. **DeRocco, W.**, Graham, P. W., Kasen, D., Marques-Tavares, G., & Rajendran, S. (2019). Supernova signals of light dark matter. *Physical Review D*, *100*(7), 075018.
18. **DeRocco, W.**, Graham, P. W., Kasen, D., Marques-Tavares, G., & Rajendran, S. (2019). Observable signatures of dark photons from supernovae. *Journal of High Energy Physics*, *2019*(2), 171.
19. **DeRocco, W**., & Hook, A. (2018). Axion interferometry. *Physical Review D*, *98*(3), 035021.

Contributing author

1. *Zheng, Q., Mingarelli, C., **DeRocco, W.**, Nay, J., Boddy, K., & Dror, J. (2025). Probing picohertz gravitational waves with pulsars. *Physical Review D*.
2. Fernandes, R. B., et al. Are We There Yet?: Challenges in Quantifying the Frequency of Earth Analogs in the Habitable Zone. *Publications of the Astronomical Society of the Pacific*. (2025).
3. Galanis, M., **DeRocco, W.**, & Lasenby, R. (2022). Dark matter scattering in astrophysical media: collective effects. *Journal of Cosmology and Astrophysics, 2022*(05), 015.
4. Baum, S., **DeRocco, W**., Edwards, T. E., & Kaalia, S. (2021). Galactic geology: Probing time-varying dark matter signals with paleo-detectors. *Physical Review D, 104(12),* 123015.
5. Baracchini, E., **DeRocco, W**., & Dho, G. (2020). Discovering supernova-produced dark matter in directional detectors. *Physical Review D, 102(7)*, 075036.

SEMINARS & WORKSHOPS

Invited Plenary Speaker

1. *International Conference on Exoplanets and Planet Formation*. (Shanghai, China; Dec. 2025.)

Organizing Committee

1. *Rogue Worlds 2025*. (Paris, France; Dec. 2025). Member of the Scientific Organizing Committee.
2. *Rogue Worlds 2024*. (Osaka, Japan; Dec. 2024). Chair of the Scientific Organizing Committee.

Invited Seminars

1. *Perimeter Institute*. (Waterloo, Ontario; Oct. 2025.)
2. *New York University*. (New York, NY; Aug. 2025.)
3. *Trottier Space Institute*. (Montreal, Quebec; Aug. 2025.)
4. *University of Michigan*. (Ann Arbor, MI; Nov. 2024.)
5. *University of Michigan*. (Ann Arbor, MI; Nov. 2024.)
6. *University of Oklahoma*. (Norman, OK; Oct. 2024.)
7. *University of Maryland*. (College Park, MD; Oct. 2024.)
8. *University of Sydney*. (Sydney, Australia; March 2024.)
9. *University of Melbourne*. (Melbourne, Australia; March 2024.)
10. *University of Maryland*. (College Park, MD; Dec. 2023.)
11. *University of California, San Diego*. (San Diego, CA; Dec. 2023.)
12. *Johns Hopkins University*. (Baltimore, MD; Nov. 2023.)
13. *Kavli Institute for the Physics and Mathematics of the Universe*. (Kashiwa, Japan; Oct. 2023.)
14. *KEK Theory Seminar*. (Tsukuba, Japan; Oct. 2023.)
15. *Stanford Institute for Theoretical Physics*. (Stanford, CA; Oct. 2023.)
16. *Institut de Physique Theorique, Saclay*. (Saclay, France; Sept. 2023.)
17. *Jeonbuk National University*. (Jeonju, Korea; June 2023).
18. *Fermi National Accelerator Laboratory*. (Batavia, IL; Feb. 2023).
19. *Perimeter Institute*. (Waterloo, Canada; Jan. 2023.)
20. *Santa Cruz Institute of Particle Physics*. (Santa Cruz, CA; Feb. 2022.)
21. *Johns Hopkins University*. (Baltimore, MD; Nov. 2021.)
22. *University of California, Berkeley*. (Berkeley, CA; Sept. 2021.)
23. *BSM Pandemic Conference Series*. (Virtual; Nov. 2020.)
24. *University of California, Los Angeles*. (Los Angeles, CA; Oct. 2020.)
25. *IBS-ICTP Workshop on Axion-Like Particles*. (Daejeon, Korea; Oct. 2020.)
26. *Virginia Tech Center for Neutrino Physics*. (Blacksburg, VA; July 2020.)
27. *Perimeter Institute*. (Waterloo, Canada; July 2020.)
28. *University of California, Berkeley*. (Berkeley, CA; Nov. 2019.)

Other conferences and workshops

1. *Dark Side of the Universe*. (Montreal, Quebec; July 2025.)
2. *AAS Division on Dynamical Astronomy Annual Meeting*. (Atlanta, GA; May 2025).
3. *How Roman Observations Will Confront Theory*. (Pasadena, CA; July 2024.)
4. *Exoplanets 5*. (Leiden, Netherlands; June 2024.)
5. *SEEC Symposium: Pathways to Non-Transiting Planets*. (Greenbelt, MD; Apr. 2024).
6. *Extreme Solar Systems V*. (Christchurch, New Zealand; March 2024.)
7. *KEK Workshop of Particle Phenomenology*. (Tsukuba, Japan; Nov. 2023.)
8. *5th New Physics Korea Institute*. (Busan, Korea; June 2023.)
9. *16th International Conference on Particle Physics and Cosmology*. (Daejeon, Korea; June 2023.)
10. *UCLA Dark Matter Conference*. (Los Angeles, California; March 2023.)
11. *16th International Workshop on the Dark Side of the Universe*. (Sydney, Australia; Dec. 2022.)
12. *Dark Matter in Compact Objects Workshop*. (Seattle, WA; Aug. 2022).
13. *14th International Conference on the Identification of Dark Matter*. (Vienna, Austria; July 2022.)
14. *Towards the Next Fundamental Scale of Nature Workshop*. (Mainz, Germany; July 2022).
15. *24th Conference From the Planck Scale to the Electroweak Scale*. (Paris, France; June 2022).
16. *Feebly-Interacting Sectors Impact on Cosmology and Astrophysics*. (Virtual. Feb. 2022.)
17. *24th Conference on Particle Physics and Cosmology*. (Urbana-Champaign, IL; Aug. 2021.)

18. *European Physical Society Conference on High Energy Physics*. (Hamburg, Germany; July 2021.)
19. *Phenomenology 2021*. (Pittsburgh, PA; June 2021.)
20. *16th Conference on Topics in Astroparticle and Underground Physics*. (Toyama, Japan; Sept. 2019.)
21. *CYGNUS Workshop on Directional Dark Matter Detection*. (Rome, Italy; June 2019.)
22. *Invisibles Workshop on Neutrinos, Dark Matter, and Dark Energy*. (Valencia, Spain; June 2019.)
23. *15th Patras Workshop on Axions, WIMPs, and WISPs*. (Freiburg, Germany; June 2019.)