

Nicole Neto Godry Farias

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Education

University of California, Berkeley

PhD, Physics (GPA: 3.53)

Berkeley, CA

Master of Science, Mechanical Engineering

Aug 2020 - Present

Purdue University

Bachelor of Science, Mechanical Engineering (GPA: 3.88)

Aug 2018 - May 2020

West Lafayette, IN

Aug 2014 – May 2018

PhD Research Work

UC Berkeley, Lee Lab - Graduate Researcher, Cosmic Microwave Background

Aug 2020 – Present

The following projects were part of international collaborations across multiple universities and research institutions. I presented technical results and shared expertise with collaborators on a weekly basis. I was also a research mentor to 7 undergraduate students.

- **Cryogenic readout electronics assembly for the LiteBIRD satellite mission**

Skills: cryogenic hardware testing, thermal design, electrical design, data analysis with Python

- Led the design of mechanical assembly to support digital-frequency-multiplexing electronic components in a space instrument. Presented results in "Development of LiteBIRD's cold readout sub-assembly" at the 2024 SPIE Astronomical Telescopes and Instrumentation conference.
- Improved noise performance of cryogenic readout system to meet space mission requirements.

- **Deployment of a cosmic microwave background instrument**

Skills: deployment of cryogenic instrument, on-site hardware troubleshooting

- Assembled cryogenic receiver and telescope components on site, at an altitude of 5,200 meters.
- Implemented power and grounding scheme to support telescope operations.

- **Sensitivity analysis of the Simons Array experiment**

Skills: analysis of multi-dimensional data with Python and SQL, signal processing

- Conducted a comprehensive characterization of signal-to-noise properties of a cryogenic CMB instrument.
- Analyzed multiple properties of thousands of superconducting detectors and of multiplexed readout system to understand overall instrument sensitivity.
- Published results in two papers presented at international conferences (Peer-reviewed, journal paper submitted).

- **Analysis of circularly polarized cosmic microwave background data**

Skills: signal processing, data analysis

- Developed data pipeline to transform raw detector data into sky maps, enabling search of new cosmological signals.

- **Anti-reflection coatings for millimeter wave curved lens**

Skills: optical simulations with ANSYS HFSS, hardware development and testing in lab setting

- Simulated the performance of laser-etched metamaterial anti-reflection surfaces using ANSYS HFSS. Published results at the 2021 Low Temperature Detectors conference.
- Leveraged state-of-the-art technologies to coat alumina lenses with dielectrics and plasma thermal spray anti-reflection coatings.

Lawrence Berkeley National Lab – Graduate Researcher, Cryogenic Devices

June 2025 – Aug 2025

- **Feasibility analysis of vibration mitigation with cryogenic piezoelectric device**

Skills: Mechanical simulations with Simulink and MATLAB

- Simulated mechanical system to demonstrate feasibility of a cryogenic vibration controller.

Master's Research Work

UC Berkeley, FLOW Lab - Graduate Researcher, Two-Phase Fluid Measurements

Aug 2018 – May 2020

- **Measurement of air entrainment from plunging jets**

Skills: x-ray image processing with MATLAB, experiment design in fluid mechanics

- Designed, and built experiment for measurement of two-phase flow void fraction using x-ray imaging.
- Developed imaging software for bubble plume tracking and qualitative measurement of object's blur.

Undergraduate Research Work

Center for Particulate Products and Processes, Purdue University - Undergraduate Researcher

Aug 2017 – May 2018

Skills: Simulation of particulate mechanics with Rocky DEM

- Simulated biomass particle flow for biofuel combustion using discrete-element modeling.

Center for Materials Under Extreme Conditions, Purdue University - Undergraduate Researcher

Jan 2016 - May 2017

Skills: numerical simulations with Fortran

- Modeled hydrogen diffusion in nuclear fusion reactor using Fortran to understand entrapment in tokamak wall.

Work Experience

Particulate Solid Research Institute - Mechanical Engineering Research Intern

May 2018 - Aug 2018

Skills: image processing with Mathematica, design and execution of fluidization experiments

- Designed, conducted, and managed experiments in the field of solid particle fluidization.
- Developed software using Mathematica for data analysis of various bubble hydrodynamic probes and high-speed camera videos.

AgroRaptor - Software Engineering Intern

Jun 2017 - Aug 2017

Skills: image processing with Python

- Designed and implemented software architecture for agricultural image processing at drone startup.
- Optimized processing of large datasets through Python multi-threading using open-source computer vision packages.

Teaching Experience

University of California, Berkeley (Graduate):

MECENG 103 Experimentation and Measurements; PHYS 7b Electromagnetism; PHYS C21; PHYS C21 Physics and Music (140 students);
PHYS 105 Analytic Mechanics (90 students)

Purdue University (Undergraduate):

CS 159 - Introduction to C Programming; ENGR 131 - Transforming Ideas into Innovation

First-Author Publications

- Farias, N., Adkins, T., Chu, M. et al. "Performance characterization of the transition-edge sensor array, readout system, and optical coupling of the Simons Array cosmic microwave background experiment". Manuscript submitted for publication, 2025.
- Farias, N. et al. "Development of LiteBIRD's cold readout sub-assembly", Proc. SPIE 13102, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy XII, 1310214 (16 August 2024); <https://doi.org/10.1117/12.3020736>
- Farias, N., Adkins, T., de Haan, T. et al. "Understanding the Phase of Responsivity and Noise Sources in Frequency-Domain Multiplexed Readout of Transition Edge Sensor Bolometers". J Low Temp Phys 216, 352–362 (2024).
<https://doi.org/10.1007/s10909-024-03143-9> (Peer reviewed)
- Farias, N., Beckman, S., Lee, A.T. et al. "Simulated Performance of Laser-Machined Metamaterial Anti-reflection Coatings". J Low Temp Phys 209, 1232–1241 (2022). <https://doi.org/10.1007/s10909-022-02751-7> (Peer reviewed)
- Farias, N., Russell, M. et al. "On-site detector noise characterization of the POLARBEAR-2A receiver," Proc. SPIE 12190, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy XI, 121901U (31 August 2022);
<https://doi.org/10.1117/12.2627513>

Relevant Co-Author Publications

- B. Westbrook, et al, "Detector fabrication development for the LiteBIRD satellite mission," Proc. SPIE 11443, Space Telescopes and Instrumentation 2020: Optical, Infrared, and Millimeter Wave, 114435Q (15 December 2020);
<https://doi.org/10.1117/12.2562978>
- Russell, M., Sakaguri, K., Lowry, L.N. et al. "Deployment of POLARBEAR-2b". J Low Temp Phys 216, 237–245 (2024).
<https://doi.org/10.1007/s10909-024-03127-9> (Peer reviewed)
- Adkins, A., et al. "Constraints on the polarization angle oscillations of the Crab Nebula with the Simons Array and its applications to the search for axion-like particles". Manuscript submitted for publication, 2025.
<https://arxiv.org/abs/2512.18882>

Graduate School Awards

- Graduate Student Mentor for the Physics Innovators Initiative Summer Scholars Program
- Berkeley Connect Fellowship
- Society of Naval Architects and Engineers Graduate Scholarship
- American Bureau of Ships Graduate Fellowship