# Makana Silva

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## Research Interest

- Cosmology using gravitational waves
- Dynamics of compact astrophysical objects
- Black Hole Perturbation Theory

## Education

**The Ohio State University (OSU)** Aug 2017-Present
Advisor: Christopher Hirata

- Doctorate in Physics, work in progress

**University of Hawai'i at Mānoa (UHM)** Aug. 2014 - May 2017
Advisor: Sarah Post

- Bachelors of Science in Physics, Magna Cum Laude

**Kamehameha High Schools, Kapālama Campus** 2014
High School Diploma

## Research Experience

**Graduate Research Assistant** Aug 2017-Present
*OSU*, Advisor: Christopher Hirata

- Analyze resonant phenomena in relativistic three-body interactions as applied to extreme mass ratio inspirals (EMRIs)
- Compute radiation profiles due to Hawking radiation around stationary black hole spacetimes
- Develop statistical measures for the impact of circumgalatic dust on weak lensing surveys
- Analyze atomic transitions in escaping atmospheres of exoplanets and calculate emitted radiation profiles
- Analyze primordial black hole mass constraints using femtolensing and microlensing techniques in order to test possibility as a dark matter candidate

**Naval Research Enterprise Internship Program (NREIP) Summer Intern** May 2017 - Aug. 2017
*Naval Research Laboratory* (NRL), Advisors: Tanner Crowder and Keye Martins

- Studied String Theory, Quantum Field Theory on Curved Spacetime, and Loop Quantum Gravity and analyzed similarities between the theories
- Applied methods of soliton analysis to General Relativity and analyzed the properties of the solitons in the Loop Quantum Gravity context
- Analyzed topological nature of solitons and compared them to certain parameters in Loop Quantum Gravity

**Mathematical Physics Research Assistant** Feb. 2015 - May 2017
*UHM*, Advisor: Sarah Post

- Obtained external funding via Undergraduate Research Opportunity Program Grant
- Developed solutions (exact and numeric) to non-linear partial differential equations relating to soliton dynamics and other non-linear mechanics
- Generated computer simulations of soliton dynamics
- tudied physical processes that can be modeled by systems of solitons
- Presented results at University of Hawai'i and other academic conferences

## Publications & Presentations

- **Publication**: **Silva, M.**, Hirata, C. *Dynamical perturbations around an extreme mass ratio inspiral near resonance*, arXiv:2207.07733.
- **Publication**: **Silva, M.**, Hirata, C. *Effects of dust in circumgalatic haloes on cosmic shear power spectrum*, 2022 ApJ **933** 19.
- **Publication**: Kaluna, H., Neal, M., **Silva, M.**, Trent, T. *A collective insight into the cultural and academic journeys of Native Hawaiians while pursuing careers in physics and astronomy*, arXiv: 2004.14136.

- **Presentation**: **Silva, M**, Trent, T., et al. *Special Session on Mauna Kea* American Astronomical Society Conference 235, Honolulu, HI, USA, 2020.
- **Publication**: Oklopčić, A., **Silva, M.**, Montero-Camacho, P., Hirata, C. *Detecting Magnetic Fields in Exoplanets with Spectropolarimetry of the Helium Line at 1083 nm*, 2020 ApJ **890** 88.
- **Publication**: Montero-Camacho, P., Xiao, F., Vasquez, G., **Silva, M.**, Hirata, C. *Revisiting constraints on asteroid-mass primordial black holes as dark matter candidates*, JCAP08(2019)031.
- **Poster**: **Silva, M**, Post, S. *Dynamics of Kinks and Lumps*, Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) STEM Conference, Long Beach, CA, USA, 2016.
- **Poster**: **Silva, M**, Post, S. *Mathematics and Applications of Solitons*, Undergraduate Research Opportunity Program (UROP) Conference, Honolulu, HI, USA, 2016.

## Educational Experience

**Board of Director** Nov. 2021 - Present
*'Ohana Kilo Hōkū*

- Lead on mentorship program and organizing/discussing community outreach events

**Educational Mentor** May. 2021 - Present
*'Ohana Kilo Hōkū*

- Mentor students and assist educators in developing astronomy and STEM focused curricula

**Teaching Assistant** Aug. 2018 - May 2019
*OSU, Physics 1250-1251*

- Teach introductory physics courses in Newtonian Mechanics, Electromagnetism, and Thermodynamics

**Interferometry Project Leader** Aug. 2018
*OSU, NSF Funded Project: ASPIRE*

- Develop and execute a comprehensive introduction to basic wave interferometry to high school girls
- Guide students in using oscilloscopes and radio equipment to execute wave experiments in order to observe wave interference effects

**Math and Physics Tutor** Sept. 2016 - July 2018
*uAchieve Learning Center*

- Assist middle school, high school, and college students with geometry, algebra, statistics, and calculus
- Develop lesson plans for each subject and modify according to student feedback

**Learning Emporium Physics Tutor** Mar. 2015 - May 2017
*UHM, College of Natural Arts and Sciences*

- Assisted students with undergraduate general physics and explaining how to carry out essential calculations in physics
- Develop lesson plans for each subject and modify according to student feedback

**Math, Chemistry, and Physics Tutor** Mar. 2015 - May 2017
*UHM, Learning Assistance Center*

- Tutored students in inorganic chemistry, classical mechanics, electromagnetism, modern physics, and vector calculus

## Technical Skills

- Python, C, Gnuplot, Mathematica, Maple

- Operating Systems: LINUX,Windows

## Achievements

**Hazel Brown Outstanding Teaching Award** Dec. 2019
Teaching Assistant Award

**Graduate Enrichment Fellowship** Aug. 2017
Academic Grant

**SACNAS Travel Scholarship** June 2016
Presentation Grant

**College of Natural Arts and Sciences Native Hawaiian Scholarship** June 2016
Academic Grant

**Vincent Z. Peterson Scholarship** June 2016
Academic Grant

**Ka Hikinia O Ka Lā Scholarship** June 2015 - June 2017
Academic Grant

**Undergraduate Research Opportunity Program (UROP) Grant** Aug. 2015
Research Grant

**Zecha Foundation Scholarship** Aug. 2015
Academic Grant

**University of Hawai'i Foundations Scholarship** May 2014
Academic Grant

## Other Interests

- Strongman, Canoe Paddling