

# Luka Sever-Walter

| [lsever-walter@ucsb.edu](mailto:lsever-walter@ucsb.edu) |

## Education

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University of California, Santa Barbara  
College of Creative Studies, B.S. in Physics

September 2021 – Expected June 2025  
GPA: 3.98/4.00

## Research Experience

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### Andrew Jayich AMO Lab

UC Santa Barbara, 2022 - Present

#### Laser Cooling and Trapping Ra-225+

June 2023 – November 2024

- Assembled microwave electronics and wrote control software to measure the ground state hyperfine splitting
- Ruled out systematic errors to the ground state splitting measurement from AC Stark shifts
- Used magnetic field stabilization to increase coherence times by an order of magnitude
- Set up double pass AOMs, Pound-Drever-Hall Cavity locks, Wavemeter locks, and a new 1079 nm laser diode for precision spectroscopy

#### Magnetic Field Stabilization

February 2022 – September 2024

- Designed a feedback and feedforward controller for magnetic field stabilization
- Optimized permanent magnet and Helmholtz coil geometries for ion traps with Python simulations
- Mentored a new undergraduate student who helped debug circuitry and install the system on two ion traps

#### Oscillator Comparison

July 2024 – September 2024

- Compared Rubidium and GPS disciplined clocks to M-Labs Sinara Urukul 9910 clocks via heterodyne mixing
- Developed analysis code to identify dominant noise type to assign uncertainties for overlapped Allan deviations

#### Laser Intensity Stabilization

August 2022 – December 2022

- Demonstrated continuous and pulsed laser intensity stabilization with Arduino microcontroller

#### Firmware Compilation and Test Suite Optimization

March 2022 – August 2022

- Converted code test suite from unittest to pytest
- Contributed to integrating Nox into GitHub for automated code testing and formatting
- Optimized firmware compilation for experimental hardware using the podman container engine

### David Weitz Biophysics Lab

Harvard University, 2019-2020

#### Lipid Vesicle Analysis

June – September 2020

- Helped develop MATLAB code to calculate stress-strain curves of lipid vesicles subjected to negative pressure gradients

#### Lipid Vesicle Optimization For Drug Delivery

June – September 2019

- Helped test different lipid concentrations to optimize lipid vesicle stability
- Fabricated device used to generate triple water-oil-oil-water emulsions to produce lipid vesicles

## Publications

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- *“Laser Cooling of Radium-225 Ions,”* Roy Ready, Haoran Li, Spencer Kofford, Robert Kwapisz, Huaxu Dan, Akshay Sawhney, Mingyu Fan, Craig Holliman, Xiaoyang Shi, **Luka Sever-Walter**, A. N. Gaiser, J. R. Griswold, A. M. Jayich

## Awards

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- UC Santa Barbara College of Creative Studies Summer Undergraduate Research Fellowship (2023)

## Talks and Posters

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- [Talk](#) at the KITP Undergraduate Research Symposium (2024) on progress towards a Ra-225 ion optical clock
- [Poster](#) at College of Creative Studies Summer Undergraduate Research Symposium (2023) on precision spectroscopy of Ra-225+ and Ra-224+

## Mentorship and Outreach

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- Advise College of Creative Studies students on finding research positions and managing academics (November 2022 – Present)
- Volunteer Instructional Assistant for Freshmen Advising Seminar (August 2024 – September 2024)
- Edited physics Wikipedia articles to improve accuracy and readability together with the Jayich Lab (November 2022 – September 2024)
- Performed physics demonstrations at local elementary schools as a part of the UC Santa Barbara Physics Circus (March 2024 – July 2024)
- Learning Assistant for Upper Division Undergraduate Quantum Mechanics (January 2023 – March 2023)

## Relevant Coursework

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- Graduate Quantum Mechanics: PHYS215A (A), PHYS215B (A+), PHYS215C (A)
- Graduate Many-Body Problems in Condensed Matter: PHYS217A (A)
- Analog Electronics: PHYS127AL (A)
- Graduate Electricity and Magnetism: PHYS210A (A+), PHYS210B (A)
- Graduate Statistical Mechanics: PHYS219 (A+)
- Graduate Applied Dynamical Systems: ME215A (A+)

## Technical Skills

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**Software:** Python, Pytest, FPGA interfacing (ARTIQ, Arduino IDE)

**CAD Tools:** Eagle Electronics, Fusion 360, Inventor

**Lab Skills:** Pound-Drever-Hall Cavity Locks, Wavemeter locks, Double Pass AOMs, Arduino, Sinara Hardware, Analog Electronics

**Languages:** English, German, Croatian