Samuel Gebretsadkan

Samuel-Gebe | Samuel Gebretsadkan | sam.gebe23@gmail.com

Summary

I am a fourth year physics undergraduate at the University of California, Santa Barbara. My interests lie in quantum computing and precision measurement using trapped ions and optical tweezers. My background is in trapped-ion optical clocks. For details on our group's work click here.

Research Experience

Undergraduate Researcher (Andrew Jayich Group) Jan 2020 - present

- Environment Monitoring System
  - Constructed independent and robust temperature, humidity, and pressure monitoring system.
  - Programmed a microcontroller and built a server to wirelessly collect and upload data using C++ and python.
- Laser Intensity Stabilization
  - Developed a laser intensity stabilizing system using a Redpitaya (FPGA). [Project on Github]
  - Stabilized laser intensity to 0.2% of it's mean value in the *Measurement of the* Ra^+ $7p^2P_{3/2}$ *state lifetime*
  - Designed a pulsed stabilization system which involved producing printed circuit boards and creating a stabilization code base on a microcontroller using C++.
- Strontium-88 Ion Clock
  - Demonstrated a novel $^+Sr^{88}$ ion optical clock by driving the $\Delta m_J = 0$ transitions from the $S_{1/2}$ to $D_{5/2}$ manifold.
  - Wrote the clock experiment sequence code on a Sinara control board using Advanced Real-Time Infrastructure for Quantum physics (ARTIQ) experiment control software.
- Towards Strontium-87 Ion Clock
  - Building a double stage injection lock setup for the clock laser.
  - Identifying a state preparation scheme for an ion of nuclear spin 9/2.

Education

2019 - present	B.S. (Physics) at **University of California, Santa Barbara**	(GPA: 3.9/4.0)
2015 - 2019	Highschool diploma at Abraham Lincoln highschool	(GPA: 3.9/4.0)

Publications

Measurement of the Ra^+ $7p^2P_{3/2}$ *state lifetime*
M. Fan, C. A. Holliman, A. Contractor, C. Zhang, **S. Gebretsadkan**, and A. M. Jayich
Physical Review A ***105****, 042801 (2022)*

Talks

09/ 2022 *Towards a $^{87}Sr+$ Ion Optical Clock.*
Undergraduate Research Symposium. Link to Video

08/ 2022 *$^{88}Sr^{+}$ Ion Optical Clock.*
California Alliance for Minority Participation (CAMP) poster session.

05/ 2022 *A $^{87}Sr+$ Ion Optical Clock.*
Gene and Susan Lucas Undergraduate Research Fund.

02/ 2022 *Pulsed Laser Intensity Stabilization for Trapped-Ion Experiments.*
CAMP Statewide Symposium (Received Honorable Mention Award).

11/ 2021 *Demonstration of Pulsed Laser Intensity Stabilization.*
Research and Creative Activities Conference (RACA-CON).

08/ 2021 *Towards Pulsed Laser Intensity Stabilization.*
California Alliance for Minority Participation (CAMP) poster session.

Skills

Python	Proficient at writing experiment code on Sinara hardware. Proficient at creating servers and graphic user interfaces for controlling electronics. Experience with running simulations such as Breit-Rabi calculations.
C++	Experience with programming on microcontrollers such as an Arduino.
PCB Design	Experience in designing and milling circuit boards using software such as Eagle and Bantam Tools.
Locking Lasers	Comfortable with an array of frequency stabilizing techniques: saturation absorption lock, injection lock, offset lock and pound-drever-hall lock.
Optics	Proficient at producing double-pass setups using Acoustic Optical Modulators. Comfortable working with External Cavity Diode Lasers and high-finesse cavities.

Teaching/Mentoring Experience

U.S. Physics Olympic Team Junior Coach Oct 2022 - present

- Write exam problems for the $F = ma$ and USA Physics Olympiad Exam.

Campus Learning Assistance Services Tutor Sep 2021 - present

- Tutor physics to undergraduate students at UCSB.
- Lead small lectures for groups of students and created practice problems.

Algebra Class Teaching Assistant Jun 2019 - Aug 2019

- Provided one-on-one Algebra tutoring to high school students.
- Graded problems sets and exams, and led discussion sections.