# Caleb Aiken

**EXPERIMENTAL PHYSICS | INSTRUMENTATION | SCIENTIFIC COMPUTING**

New England, USA | calebaiken07@gmail.com | (508) 868-7965
linkedin.com/in/caleb-aiken-350276278 | github.com/calebaiken

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Physics graduate with experience in particle detection, experimental electronics, data acquisition, and Python analysis. Combines independent hardware troubleshooting with scientific computing and clear technical documentation.

## EDUCATION

### B.S. Physics, University of Massachusetts Amherst | May 2026

Advanced study in particle physics, general relativity, quantum mechanics, electromagnetism, and experimental physics.

## RESEARCH EXPERIENCE

### Undergraduate Research Assistant | Hertel Lab, UMass Amherst

February 2025 - May 2026 | Muon veto and superfluid helium research

- Integrated prebuilt Eljen Technologies PVT scintillator paddles, supplied with ET Enterprises PMTs already attached, into a cosmic-ray muon-veto system.
- Implemented NIM coincidence logic and integrated detector hardware with the data acquisition trigger chain for particle-event tagging.
- Designed, soldered, and integrated a high-pass RC filter between the amplifier and discriminator to condition detector signals.
- Developed Python/HDF5 workflows for waveform baselines, pulse identification, and event timing. Thesis analysis and manuscript preparation remain in progress.

### Experimental Physics Laboratory | PHYS 440, UMass Amherst

February 2026 - May 2026

- Built a circuit to measure quantized conductance in gold nanojunctions; analyzed eight traces with plateau structure near integer conductance quanta and documented the results.
- Set up a high-temperature superconductor experiment to acquire magnetic susceptibility and electrical resistance as functions of temperature.

## SELECTED PROJECT

### CONTINUUM Research Environment | Independent project, in development

Develop product architecture and prototypes for connected scientific reading, LaTeX authoring, computation, and AI-assisted research workflows. Use firsthand research experience to define and refine the tools.

## TECHNICAL SKILLS

**Computing:** Python, NumPy, SciPy, pandas, Matplotlib, HDF5; additional experience with C/C++, Java, and Git.

**Instrumentation:** Scintillators, PMTs, NIM electronics, coincidence logic, analog signal conditioning, soldering, NI DAQ, and cryogenic research environments.

**Communication:** LaTeX, RevTeX, technical reports, scientific manuscripts, and literature synthesis.