

Tim Healy

thealy5011@gmail.com • www.linkedin.com/in/tim-healy-/ • <https://www.timhealyworks.com/> • <https://github.com/timh5011>

Education

University of Illinois Urbana-Champaign

Bachelors of Science in Mathematics (Applied Mathematics)

Physics Minor

May 2025

Major GPA: 3.43/4.0

Technical Experience

Occidental College (Muon Tomography Lab, Supported by KoBold Metals)

Los Angeles, CA

Research Scientist (Computational and Experimental High Energy Physics)

September 2025 - Present

- Promoted from Research Assistant to Research Scientist to lead end-to-end development of next-generation cosmic air shower scintillation detectors, including design, GEANT4 (C++) simulation, and manufacturing
- Contributed to the design and fabrication of a hodoscope detector scheduled for deployment in a Turkish mine (Cayeli, 2026)
- Drove ~80% cost and ~66% assembly time reductions by redesigning detector, maintaining >94% detection efficiency
- Analytically calculated the single photon response of silicon photomultiplier (SiPM) to refine detector design
- Modeled detector response to terrestrial gamma-ray background using both analytical calculations and Monte Carlo simulations

Research Assistant

June 2025 - August 2025

- Assembled, tested, deployed, and debugged cosmic air shower detectors for surface and subsurface applications
- Soldered, tested, and debugged transmitter, receiver, and constant fraction discriminator (CFD) circuit boards
- Developed embedded IoT communication system using ESP32 and GPS, enabling OTA firmware updates via Wi-Fi
- Designed and fabricated electronics enclosures for GPS-enabled IoT communication modules integrated into detectors
- Created custom fixtures for electronics hardware by modeling in AutoCAD and manufacturing via 3D printing
- Maintained inventory of electrical components for assembly of circuit boards

Technologies: Python, MicroPython, C++, GEANT4, Embedded Software, IoT Systems, SiPMs, Oscilloscopes, Circuit Board Assembly, ESP32 Microprocessor, u-blox GPS, Over-the-air (OTA) Firmware Deployment, Analog Signal Processing, AutoCAD, 3D Printing

University of Illinois Urbana-Champaign (High Energy Physics Lab, Supported by KoBold Metals)

Champaign, IL

Research Assistant (Computational High Energy Physics)

March 2024 - May 2025

- Developed Monte Carlo simulations in GEANT4 (C++) to model high-energy muon collisions with scintillation detectors
- Verified simulation accuracy by performing analytic calculations (Bethe-Bloch, Birks' Law) for energy deposition and light yield
- Analyzed spatial and temporal distributions of simulated scintillation light yield; created visualizations (Matplotlib) for presentations
- Assembled first round prototype of cosmic air shower scintillator detectors to meet strict development deadline
- Oversaw daily lab operations, including inventory tracking, workflow coordination, and meeting facilitation

Technologies: C++, Python, GEANT4, ROOT, Matplotlib, Monte Carlo Simulations, Data Visualization, Statistical Analysis

Axis Capital Research Center

Champaign, IL

Data Engineer Intern

Jan 2023-Aug 2023

- Led statistical analysis of financial and geospatial data to model loss distributions using probabilistic CAT (catastrophe) models
- Migrated legacy SQL databases to a modern data architecture, improving data querying and retrieval times

Technologies: Python, R, SQL, Databricks Notebooks, Pandas, NumPy, Statistical Data Analysis

Leadership Experience

Special Interest Group in Mathematics and Algorithms (SIGma) of ACM@UIUC - Member

Jan 2024 - May 2024

Special Interest Group in Quantum Computing (SIGQuantum) of ACM@UIUC - Member

Jan 2024 - May 2024

American Advertising Federation at Illinois (AAF@Illinois)

Champaign, IL

Executive Board Member, Executive Account Director of CTRL+V Production Agency

June 2023 - Dec 2023

- Co-led the largest student-run video production organization on campus (~40 members), overseeing five production teams, timelines, and project outcomes; ran weekly meetings directing members through all stages of video production process
- Served as the liaison between clients and production teams, managing communication and expectations

Certifications and Skills

- Stanford Online, DeepLearning.AI Certification: Advanced Learning Algorithms
- Stanford Online, DeepLearning.AI Certification: Supervised Machine Learning: Regression and Classification
- **Tools:** Python, C++, R, SQL, Java, Mathematica; TensorFlow, Matplotlib, NumPy, Pandas; Geant4, ROOT, Jupyter, Databricks
- **Technical Skills:** Computational Physics, Mathematical Modeling, Numerical Methods, Statistical Data Analysis
- **Communication:** Strong ability to distill complex scientific ideas into accessible explanations, Data Visualization