



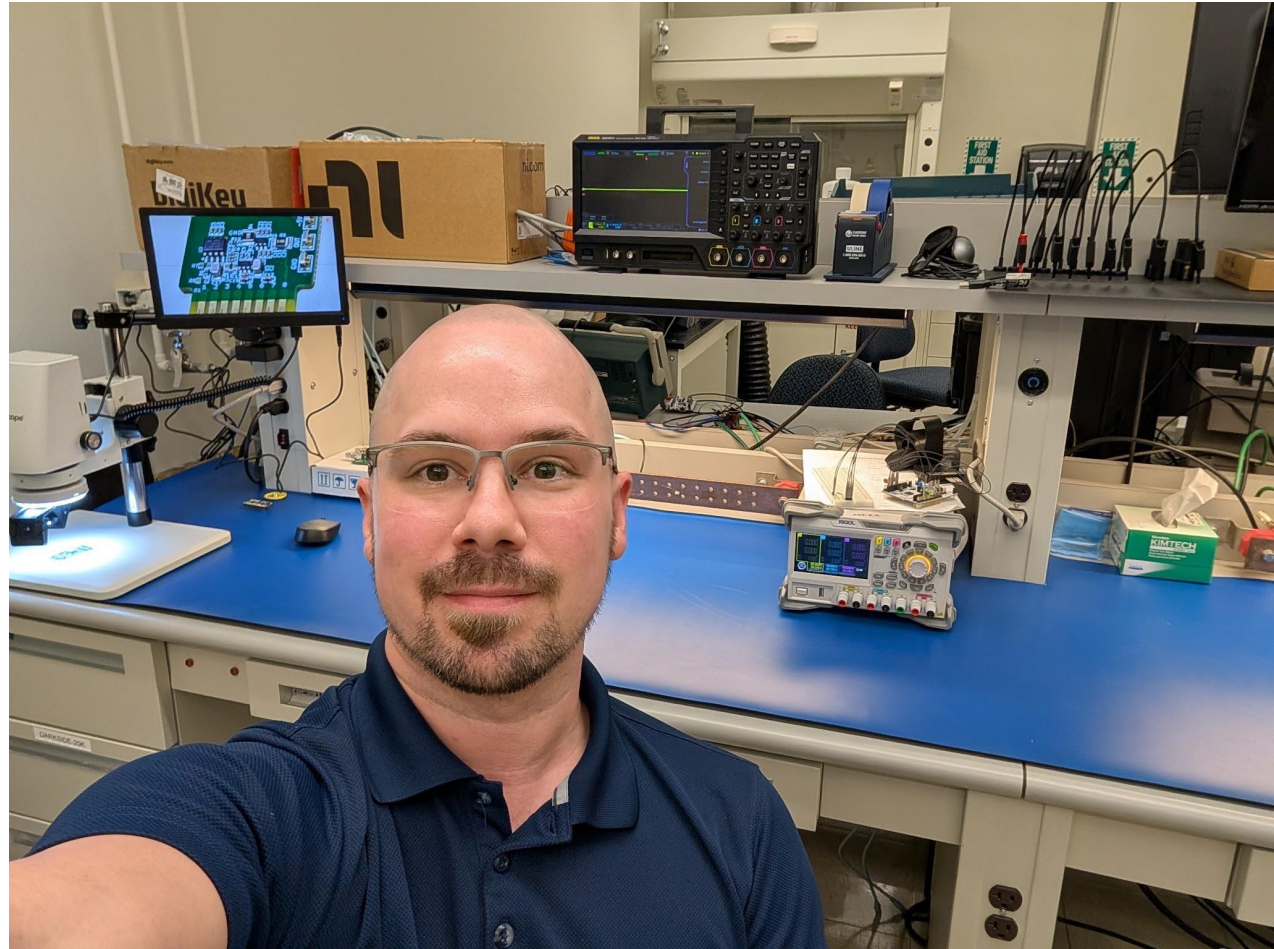
University of Alberta

Michael Rangen - McDonald Institute IPDC

July 28, 2027

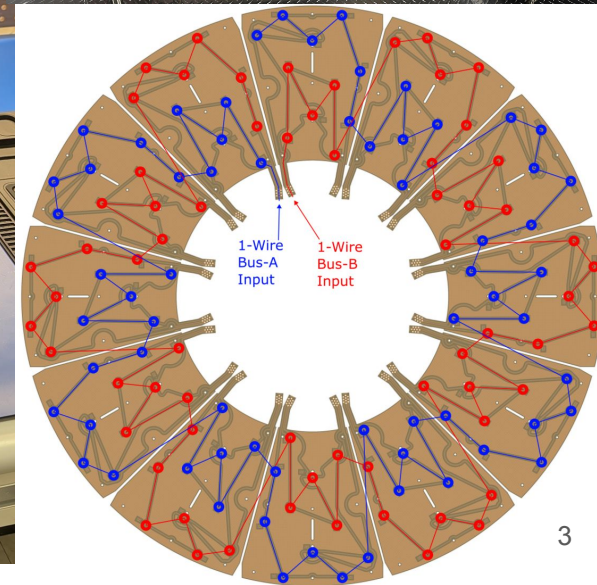
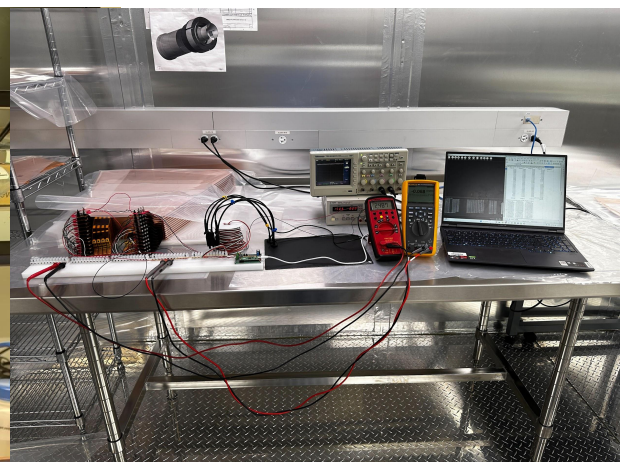
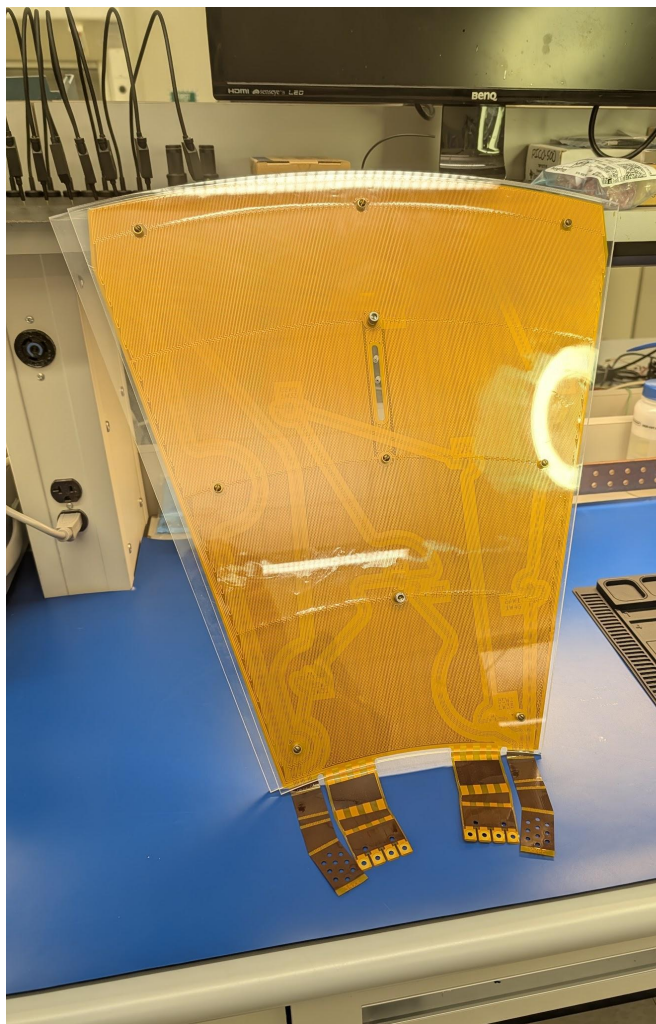
Michael Rangen

- Electronics Engineering Technologist
 - Graduated NAIT 2012
 - Spent 10 years training summer students to reverse engineer and repair electronics
 - Taught at NAIT
- 4th Class Power Engineer
 - Certified to operate a power plant
 - Good at boiling water
- McDonald Institute at UofA since November 2022



PICO-500 Heaters & Sensor Arrays

- Collaborated with Mackenzie Dean (Mech. E.) to design flexible heating and sensing arrays on flex PCBs
- Large format flex PCBs have low background
- Designed using sheet-metal principles



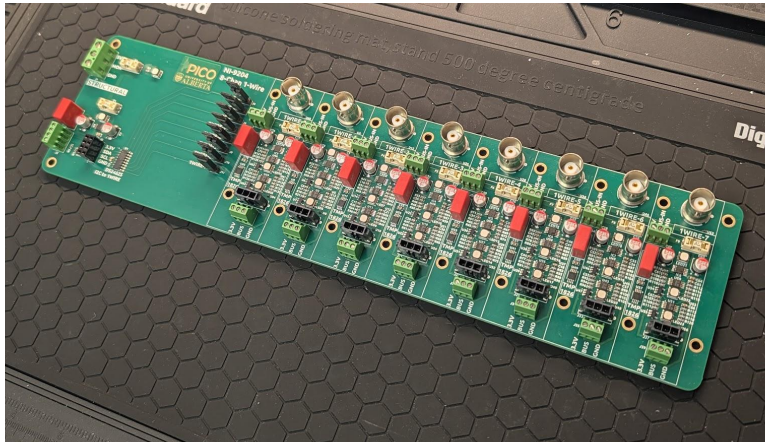
PICO-500 Piezos

- Collaborated with Dr. Mathieu Laurin (UdeM) and Mackenzie Dean to create custom piezo sensors using the lessons learned from the heater PCBs



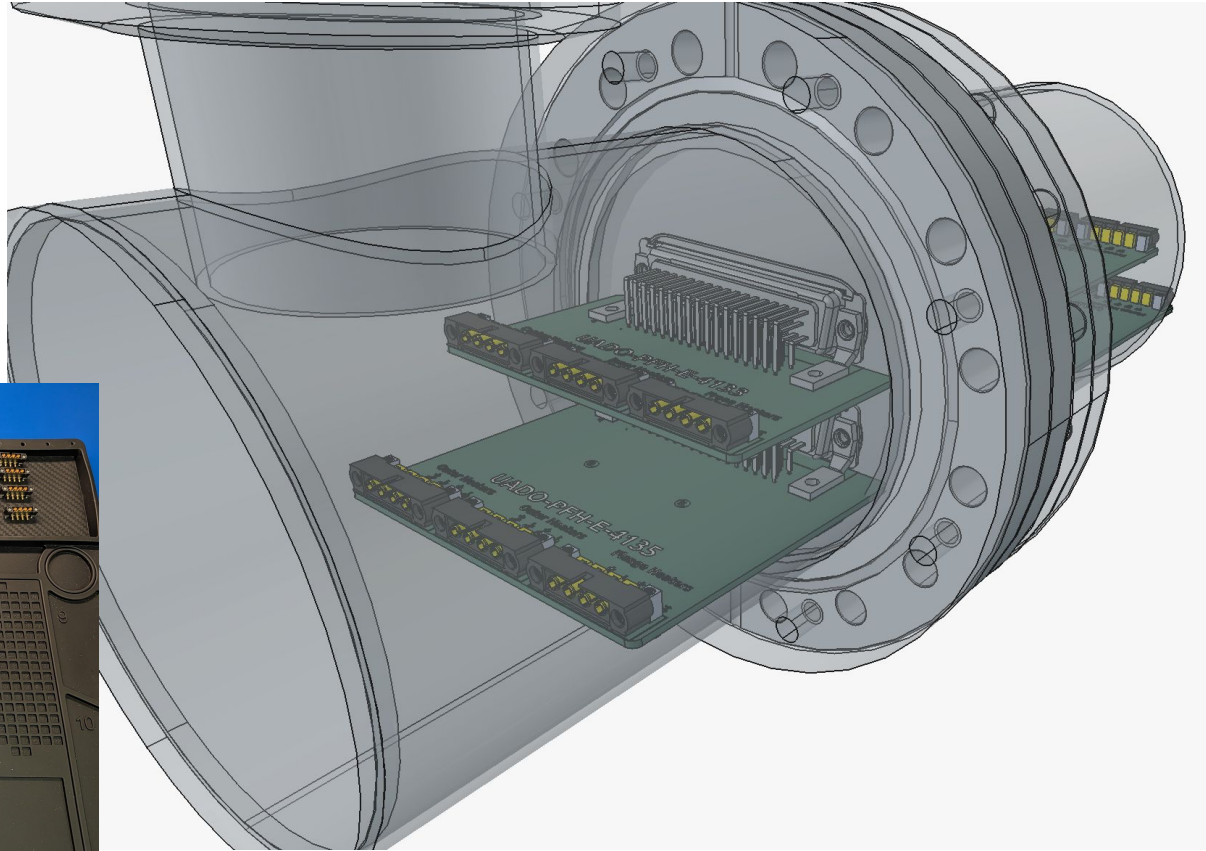
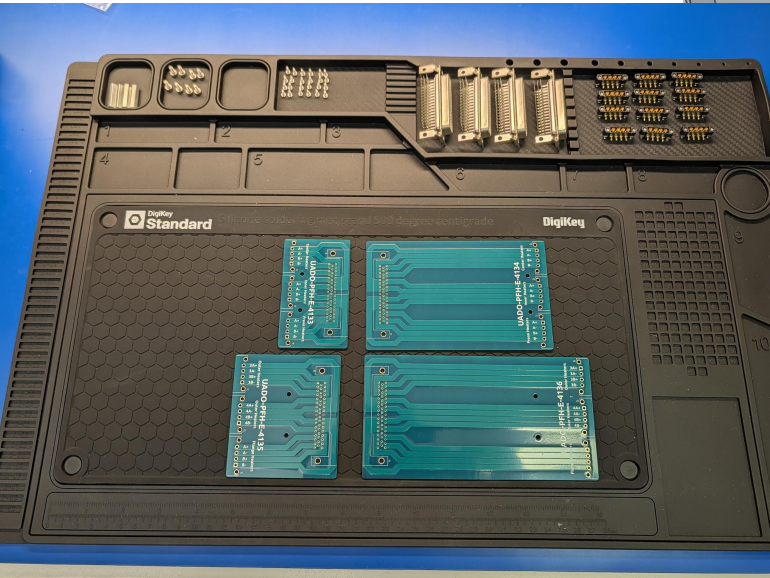
PICO-500 PLC Rack

- Collaborated with Dr. Mathieu Laurin and Manvir Gill (UofA) to design breakout and field distribution PCBs that help us organize and distribute signals for PICO-500



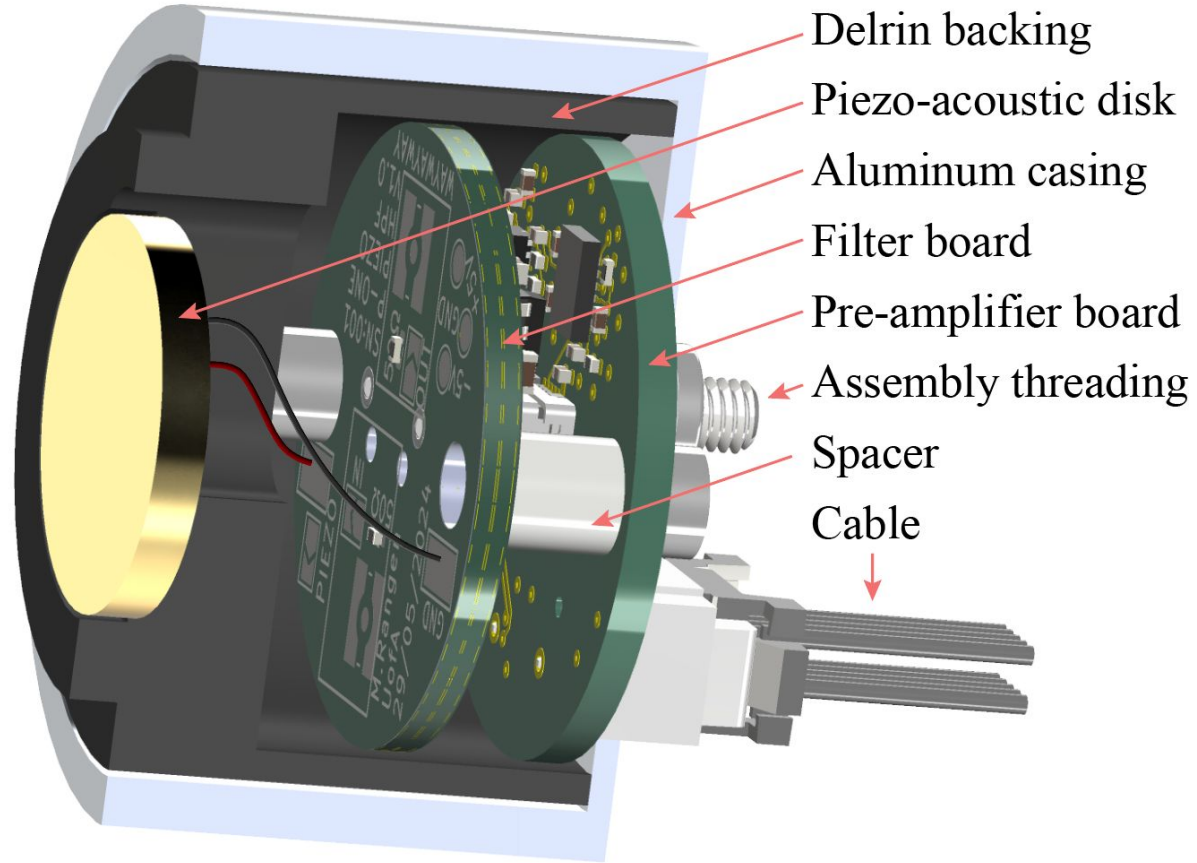
PICO-500 Heater Feedthroughs

- Designed and built high current feedthrough PCBs for delivering power to the heaters inside of the detector



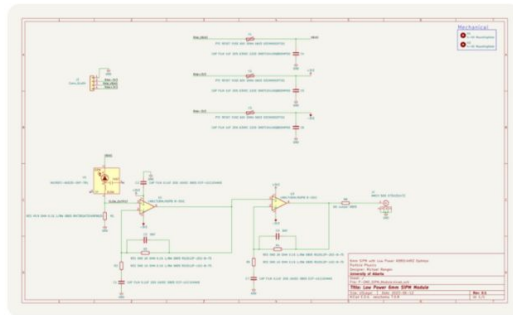
P-ONE Hydrophone

- Collaborated with Mathias Danninger (SFU), Felix Henningsen (SFU), and Dilraj Danninger (SFU) to create a preamp & filter that struck a balance between scientific and operational requirements
- <https://iopscience.iop.org/article/10.1088/1748-0221/20/07/P07003>

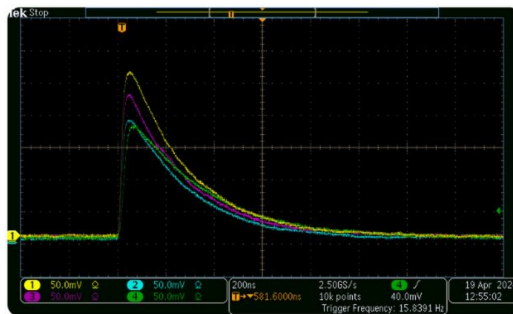
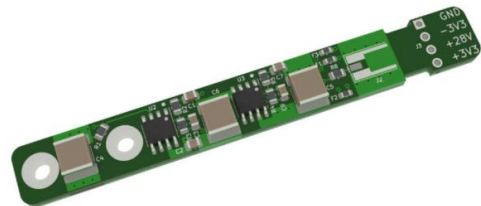


P-ONE MIST

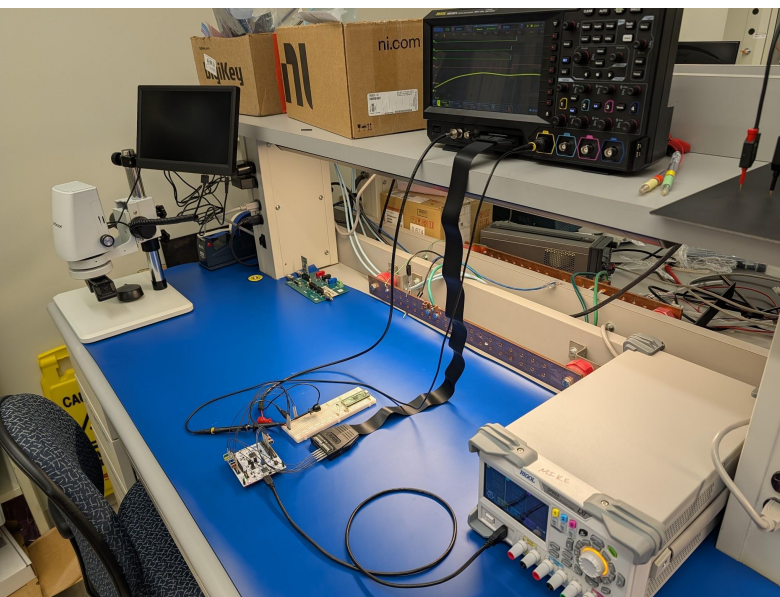
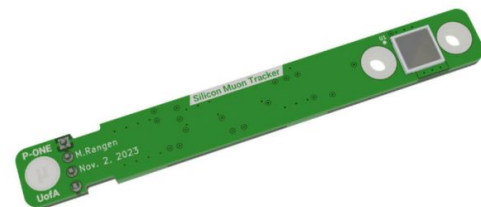
- Designed PCBs for the P-ONE-1 Muon In Situ Tracker
- Working on new and improved design for P-ONE-D



SiPM board version 3

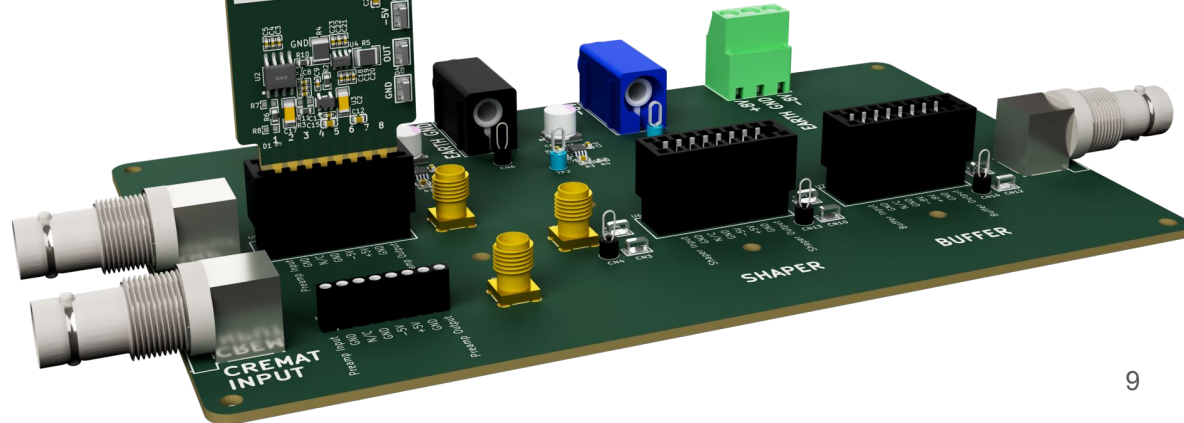
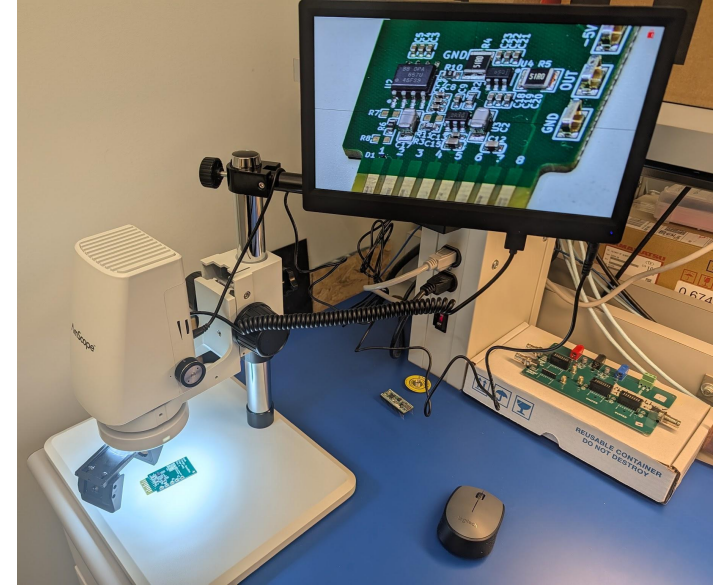
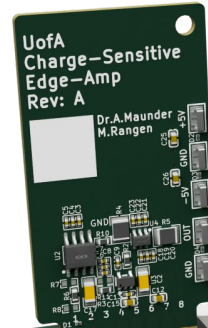
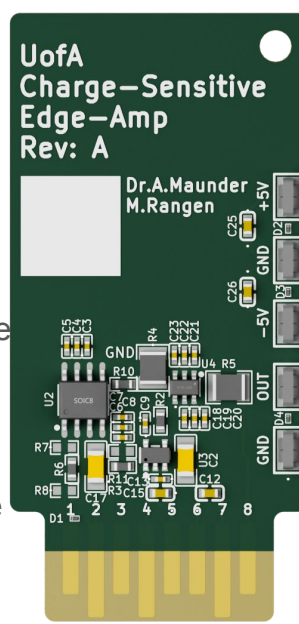


Typical muon SiPM signals from 4
scintillators in a pile.



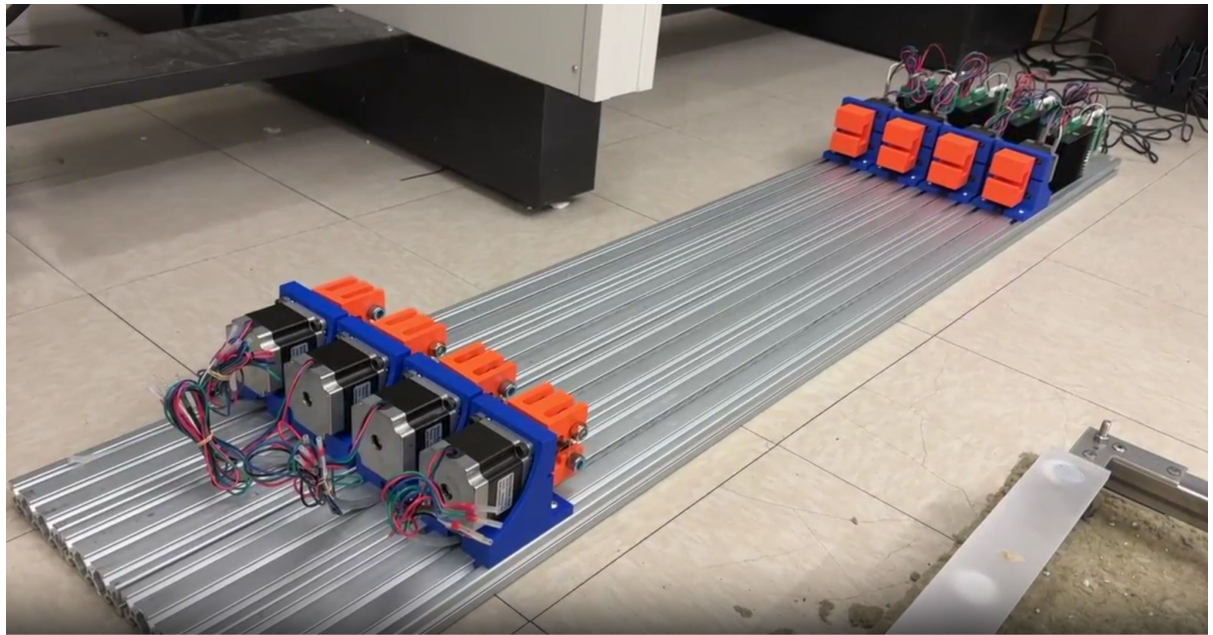
Charge Sensitive Amplifier

- Designed a auto-zeroing charge sensitive amplifier for Marie-Cecile's mini spherical proportional chamber at UofA
- General purpose design can be used for other experiments
- Designed to be modular and easily replaced and modified



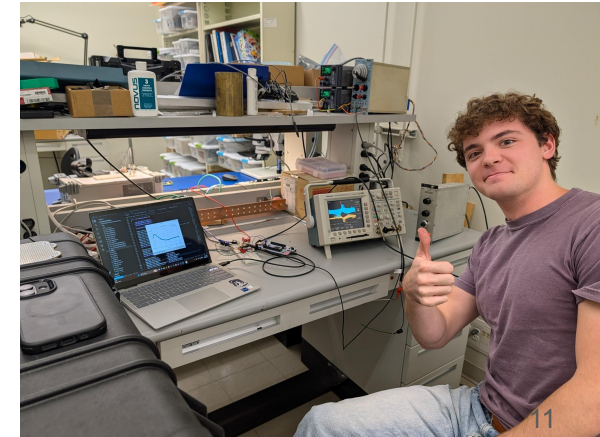
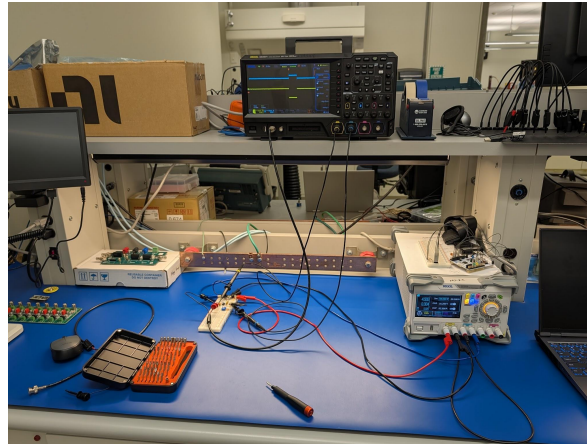
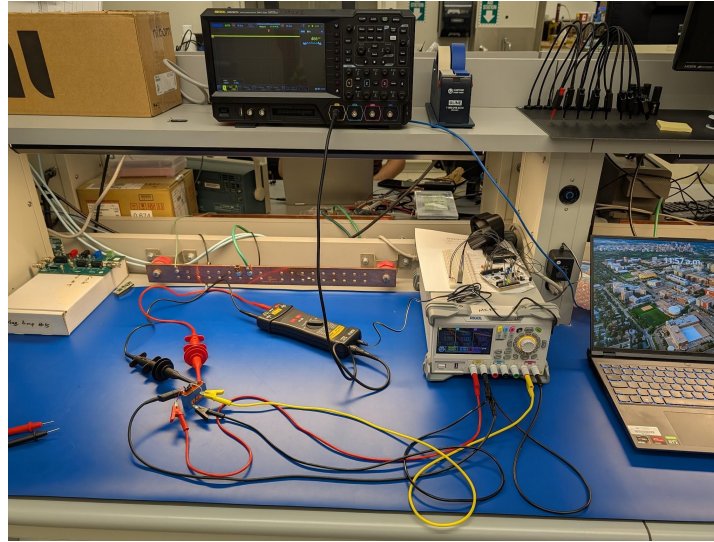
Darkside-20k Acrylic Creep Robot

- Designed and built a set of robotic flippers to automate and control rotation of acrylic bars for creep testing



Darkside-20k Radon Monitor

- Currently working with the Darkside team to develop a modular and readily deployable radon monitoring solution



Questions?