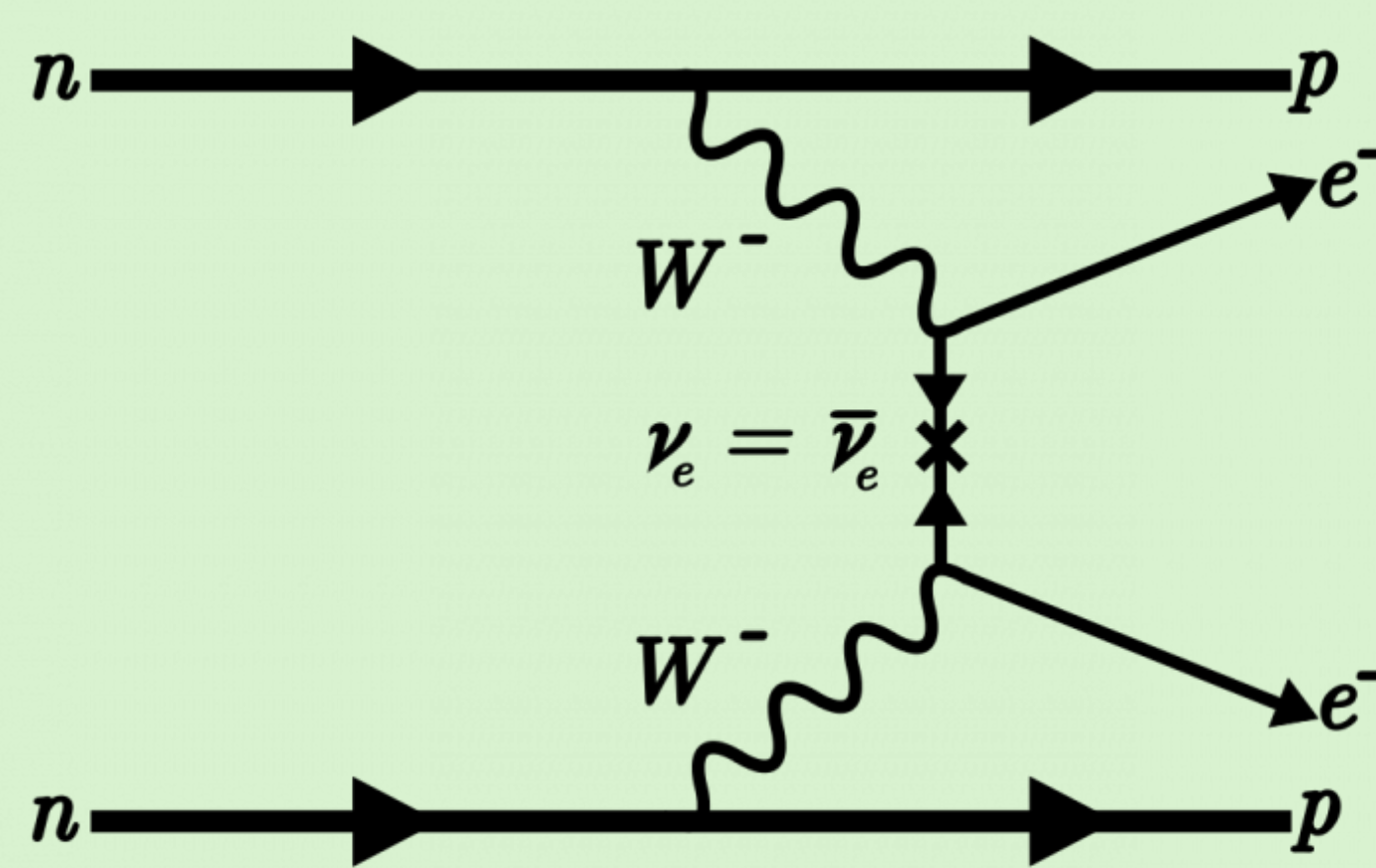


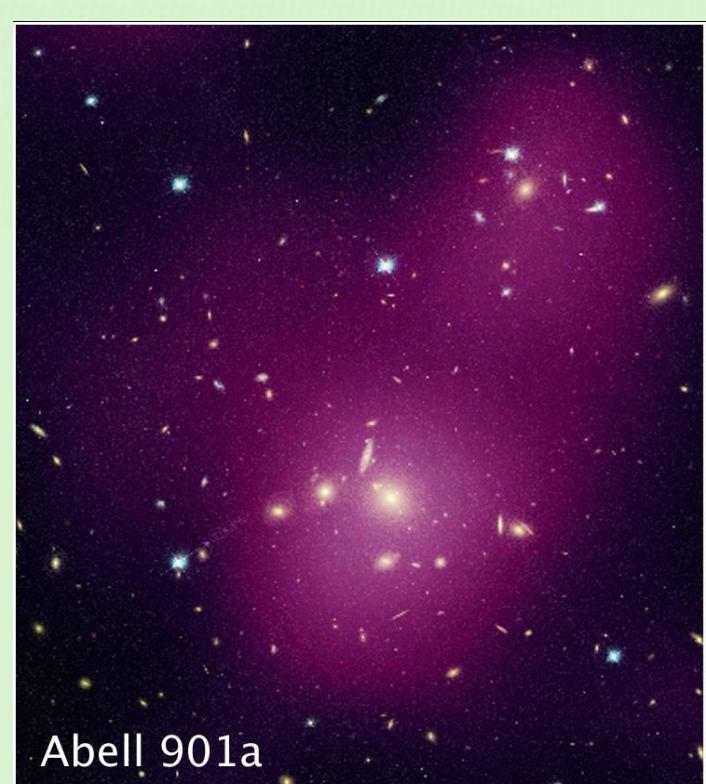
The Light-only Liquid Xenon Detector (LoLX)

Eleanor Allen (McGill University) on behalf of the LoLX Collaboration

Motivation



At right, map of dark matter in the Abell 901 supercluster taken by the Hubble telescope and a telescope in La Silla, Chile from figure [1].

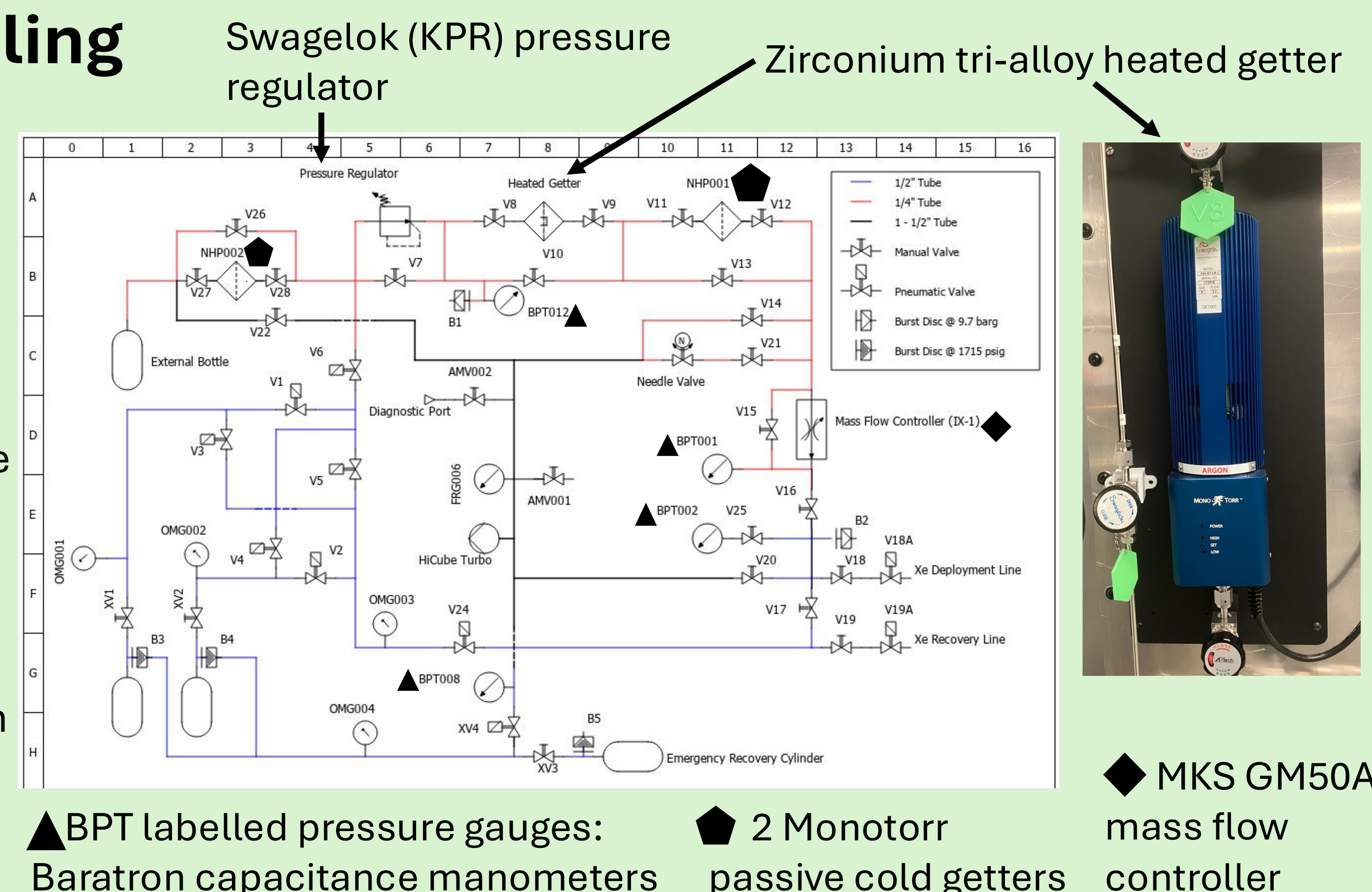


LXe detectors are ideal to search for:

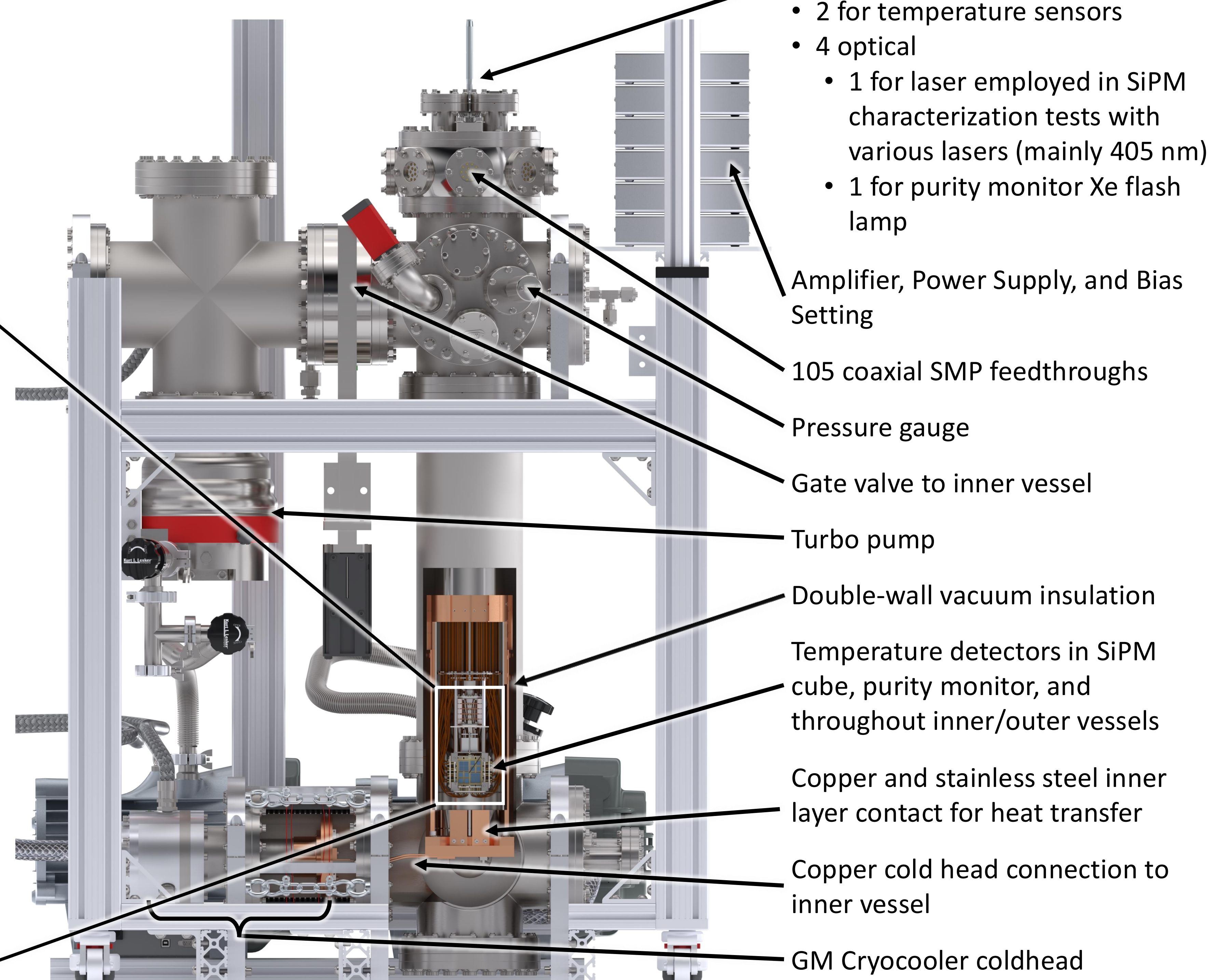
- neutrinoless double-beta decay ($0\nu\beta\beta$) events
 - dark matter interactions
- LoLX is a ~5 kg small scale detector for:
- radioactive source development
 - optical simulation benchmarks
 - LXe SiPM testing
 - Cherenkov light detection

Gas Handling System

- GXe deployment through purifiers (max 5 slpm)
- Recovery of GXe from LoLX via cryopumping into storage cylinders
- No recirculation or purification after deployment



LoLX Cryostat and Control



LoLX Instrumentation

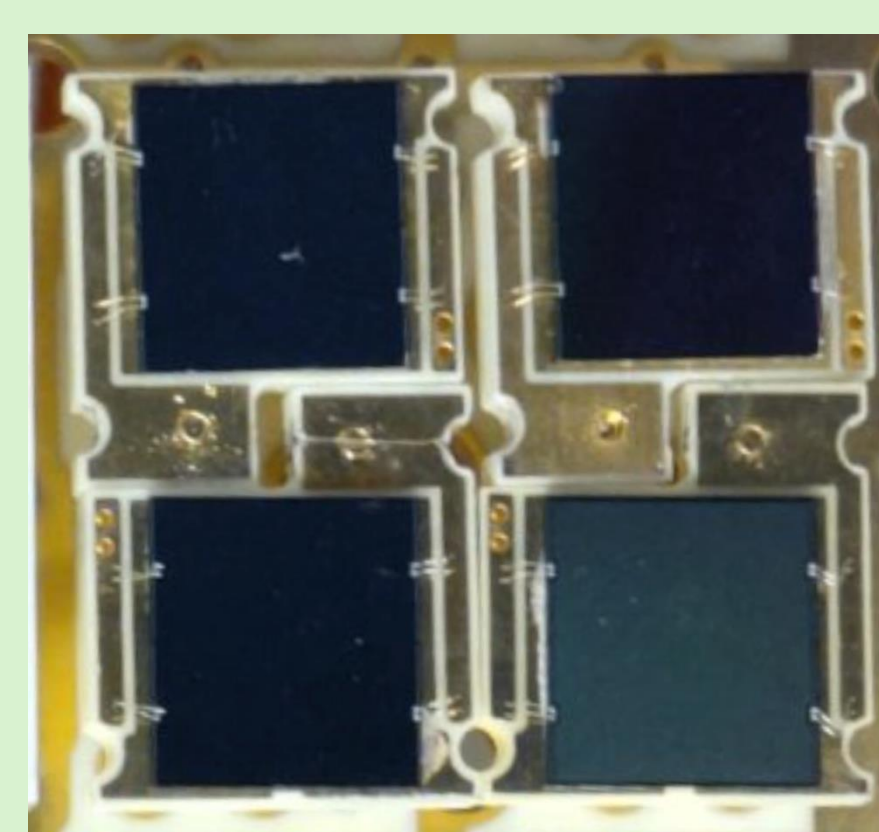
LXe purity monitor

- Cu field-shaping rings at increasing potentials upward
- Xenon purity inferred from effective e^- drift lifetime, determined by drift time and charge loss

Photomultiplier tube (PMT) for SiPM reference

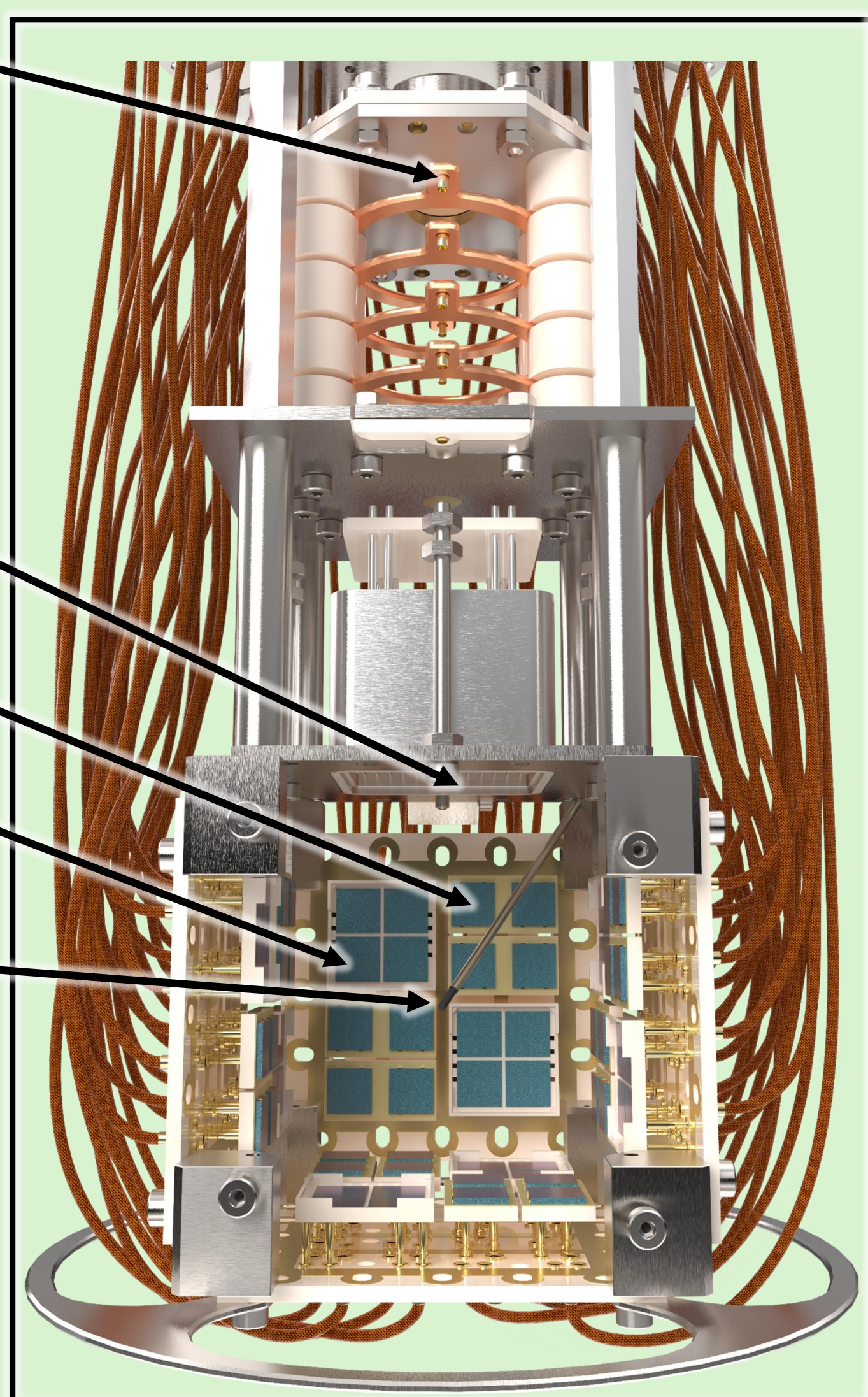
40 Fondazione Brune Kessler (FBK) SiPMs

40 Hamamatsu (HPK) SiPMs



Calibration source

At left, tile of 4 FBK SiPMs

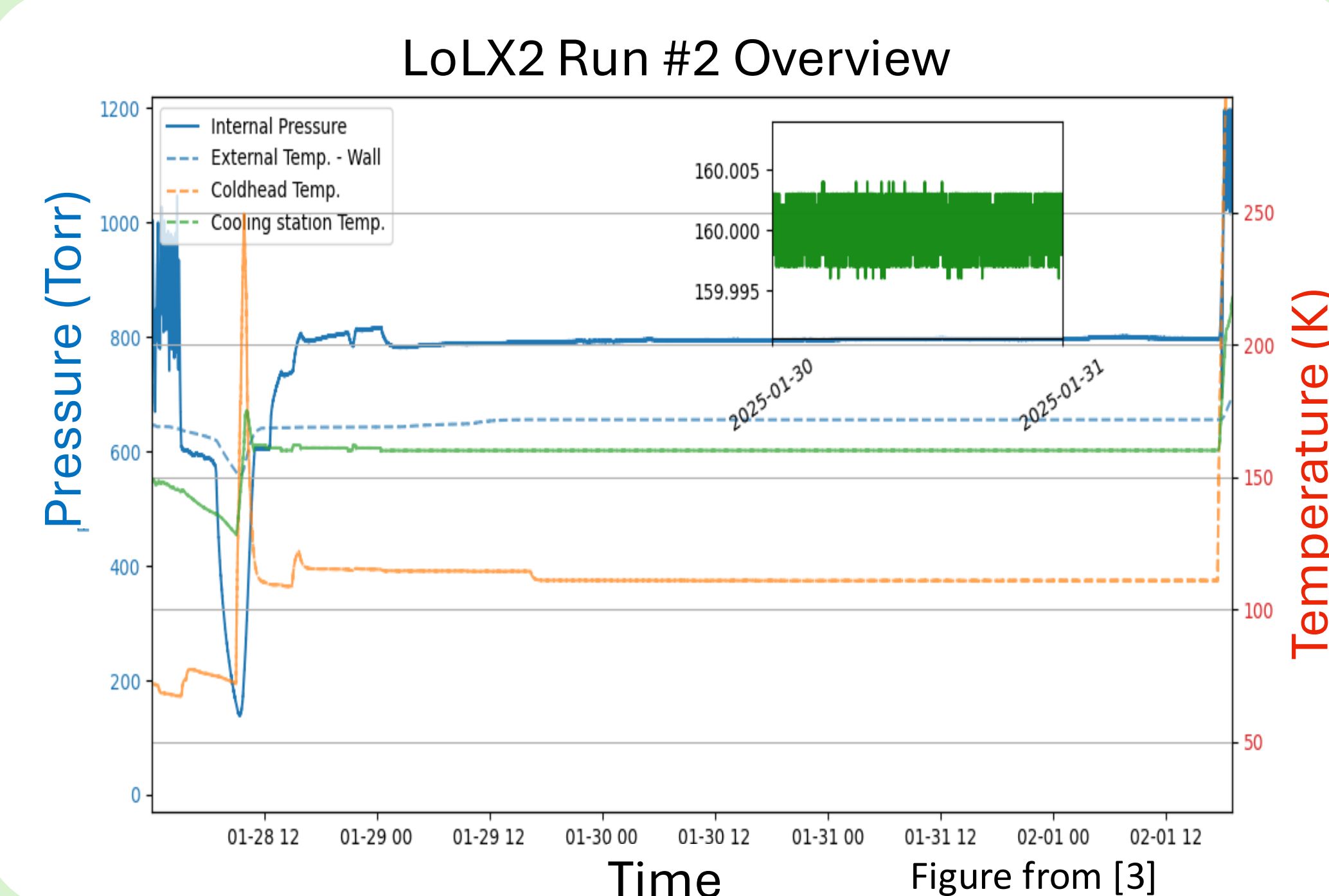


Slow Control

MIDAS (Maximally Integrated Data Acquisition System) is used to monitor and control cryostat and SiPM voltages.

Stable pressures and temperatures during 2025 run

- Blue: internal vessel temperatures
- Green and orange: external vessel temperatures



Data Acquisition and Processing

4 HPK SiPMs

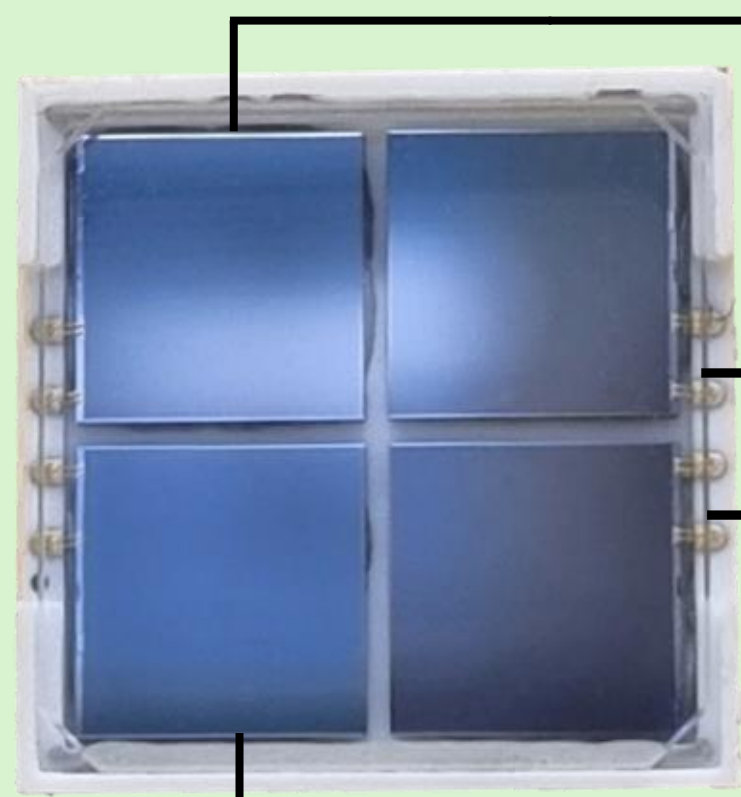
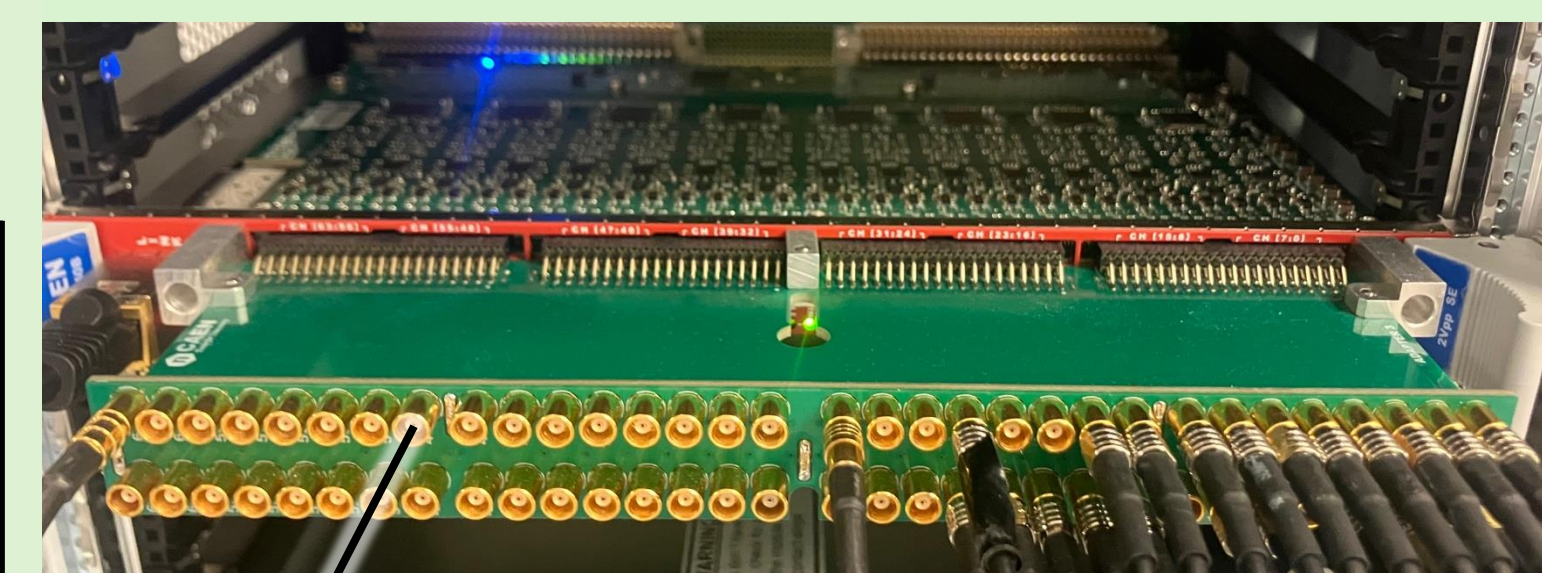


Figure from [2]

Bias voltage setting and power supply

8 individual SiPM channels and 22 summed input channels (as pictured) of 4 SiPMs each

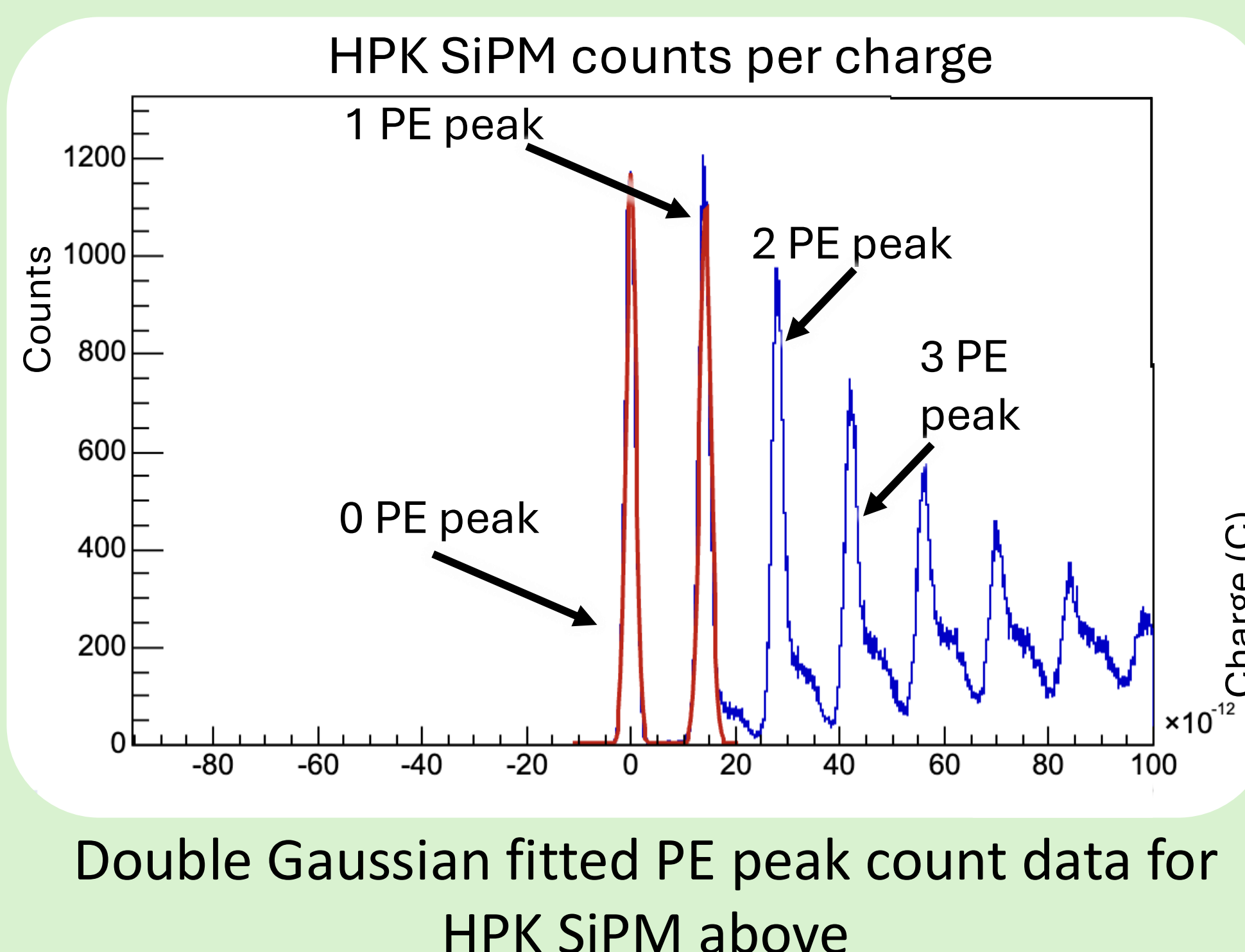
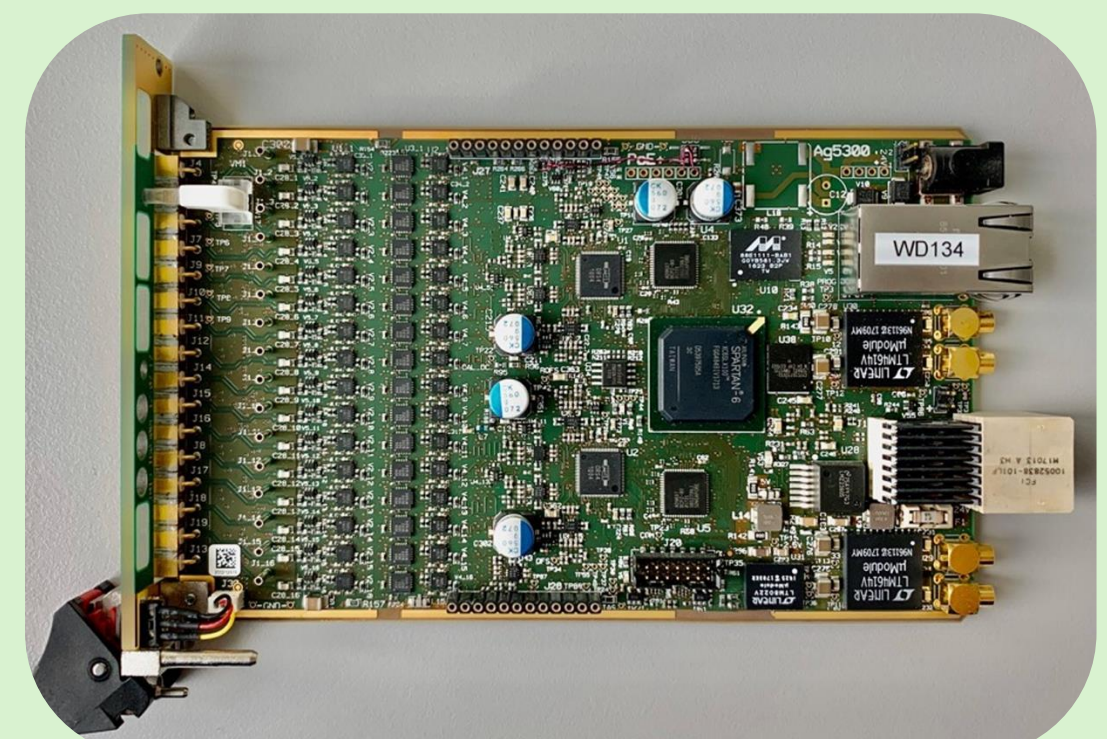


Vx2740 analog-to-digital converter boards (above)

- 8 ns time resolution/16 bit
- 64 independently functional channels
- 2 V_{pp} input range
- 2 level customizable triggering

Alternative: PSI/INFN WaveDAQ (below right)

- 10 ps time resolution/12 bit
- Must run all 16 channels at once
- 1 V_{pp} input range
- Firmware coded triggering



Double Gaussian fitted PE peak count data for HPK SiPM above