



Crytur prototype 2.0

Tests at Jefferson Lab February-March 2023

Updated configuration



- 3 x 3 PWO
- 4 x 4 SiPM array per crystal
- Fixed SiPM bias
- Signal preamplifier with
 - Remotely adjustable gain
 - Remotely adjustable offset
- Low power consumption
- No active cooling needed
- Modular: SiPM array replaceable when needed
- Compact, no external electronics

Mechanical assembly:

Digitally Controlled

- amplifier 1 – 10x
- Ground setting

signal output

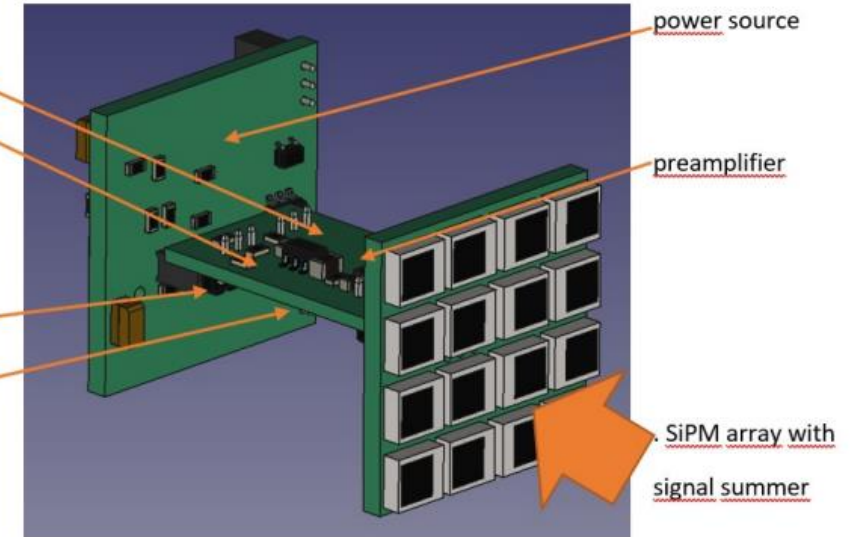
bias controller

power source

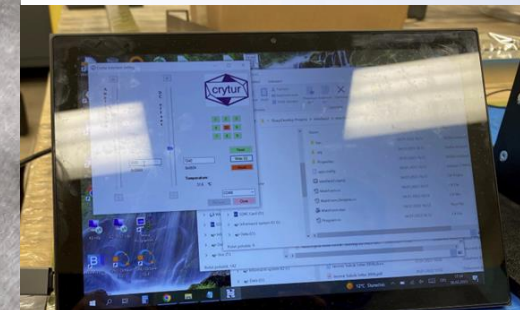
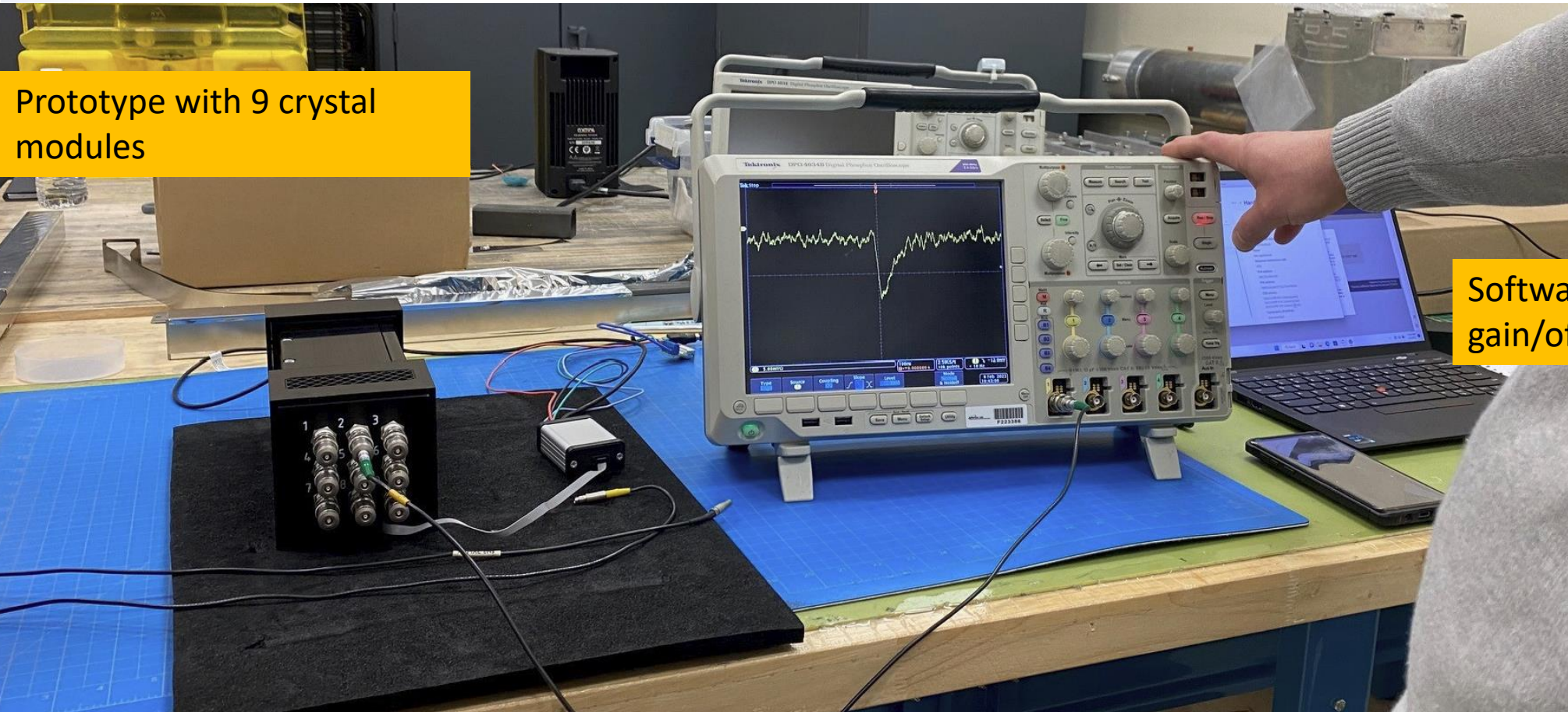
preamplifier

SiPM array with

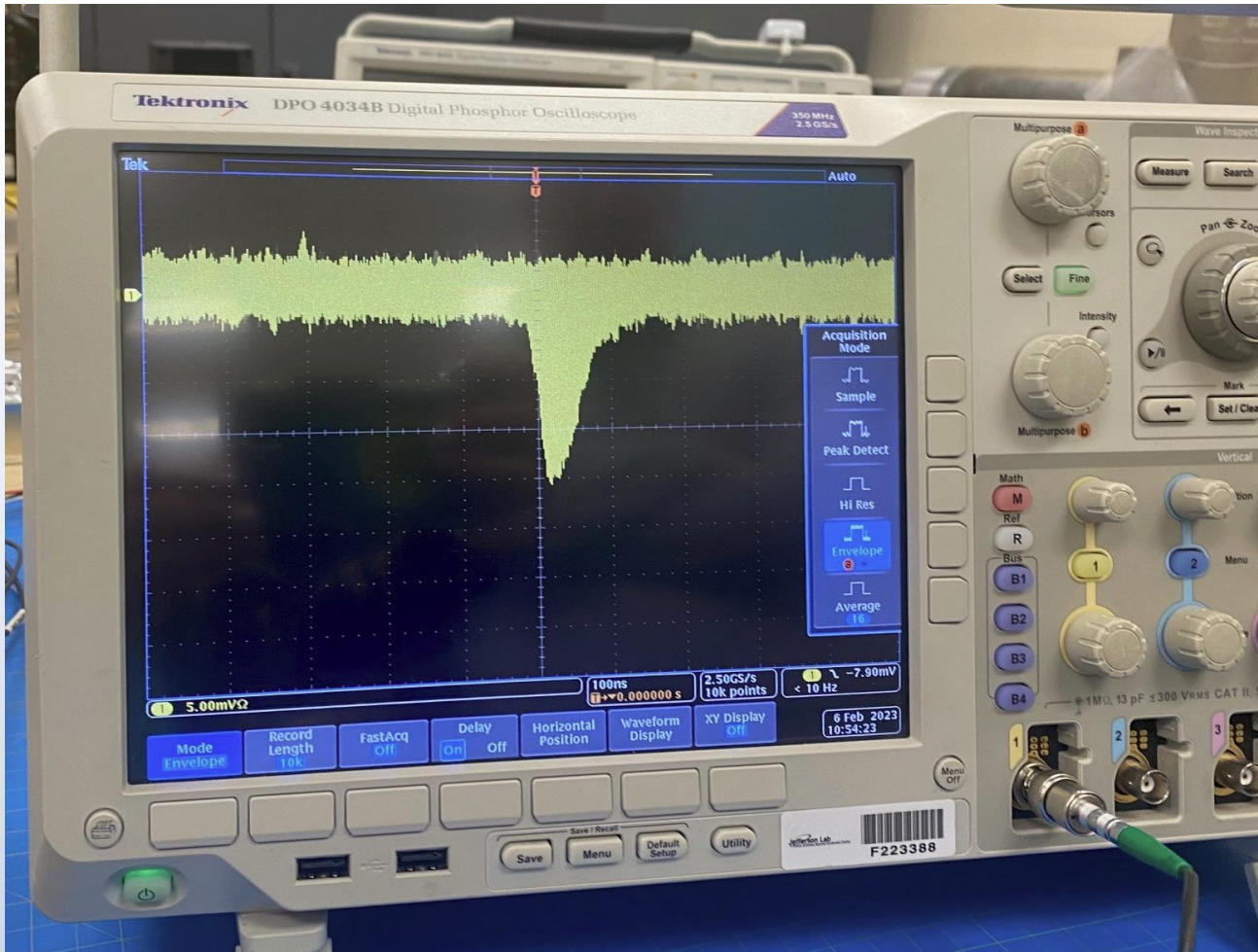
signal summer



Detector calibration tests with cosmons



Calibration with cosmic ray at 15 MeV



The calibration was performed with cosmic rays at 15 MeV. The output amplitude was set at 5-7mV to cover the full dynamic range expected at the EIC.

Setup in Hall D

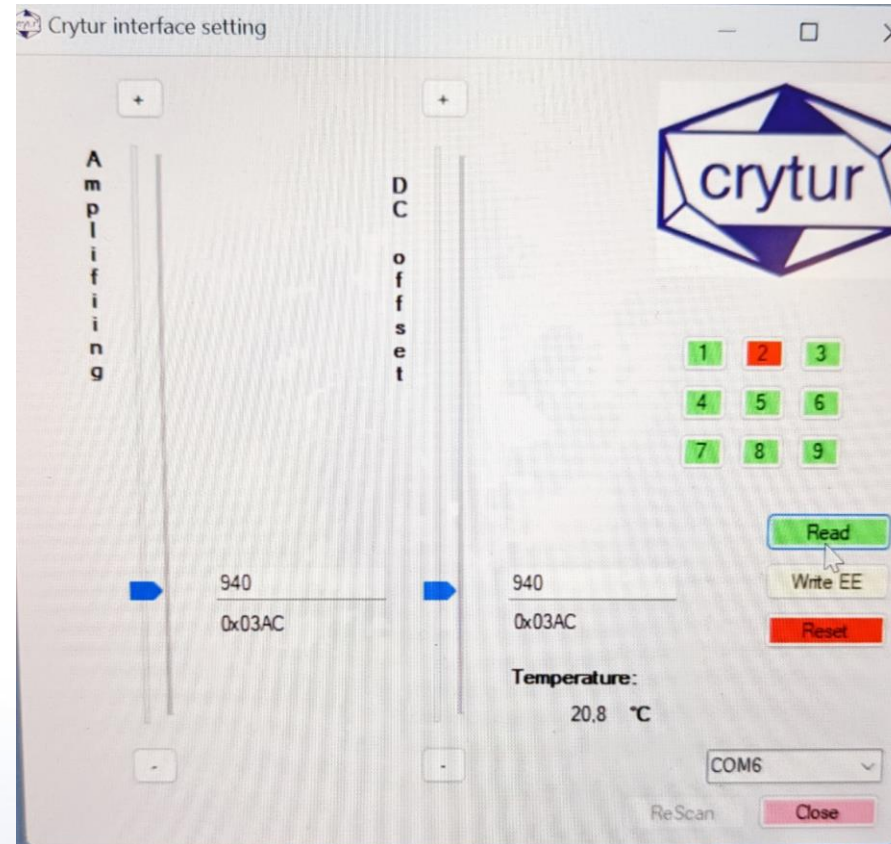


Detector interface

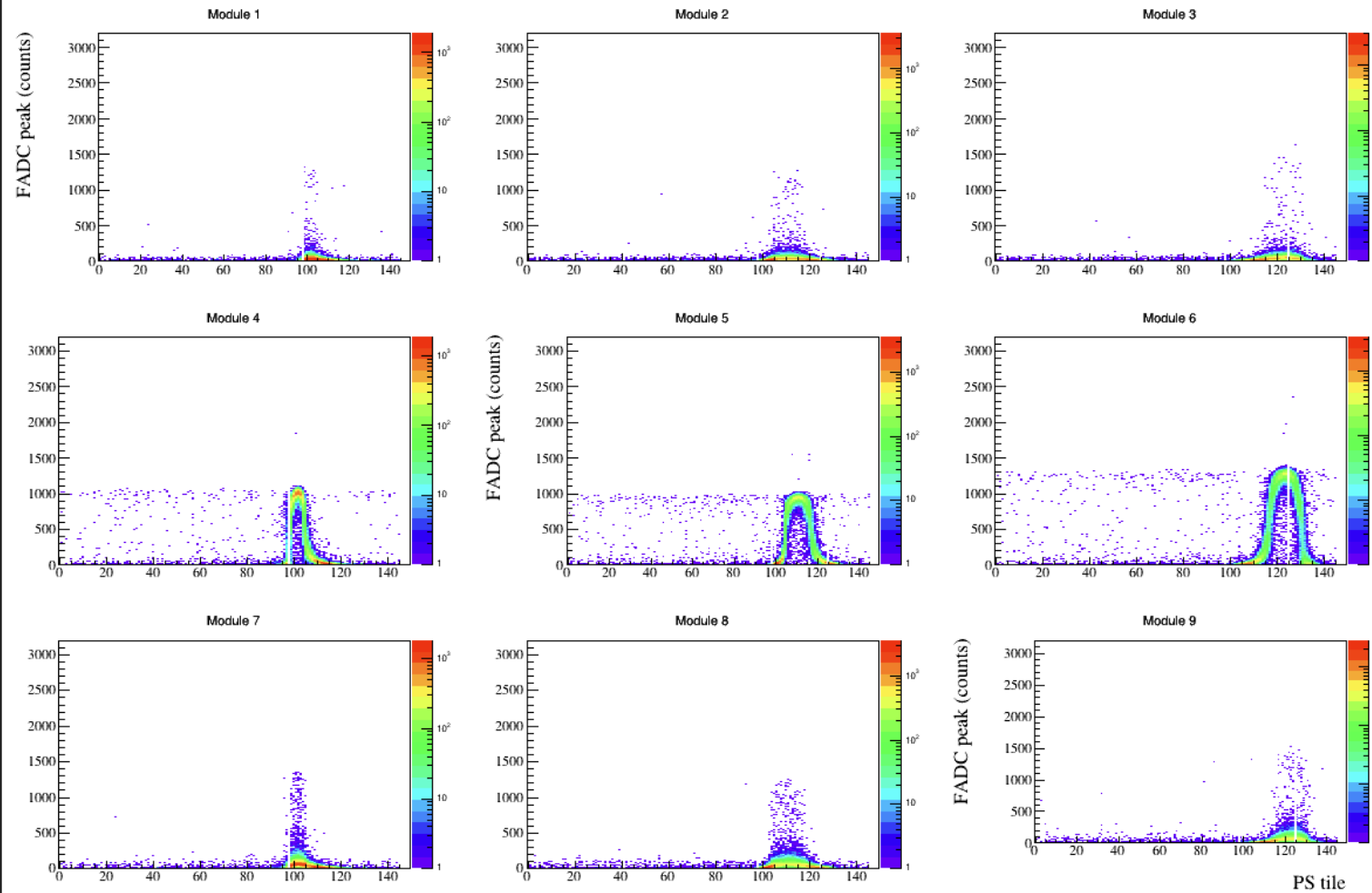
- Gain & offset settings saved locally on EEPROM
- Remotely adjustable for individual pixels
- Preamp Temp readout
- 20.8 C at steady state



USA



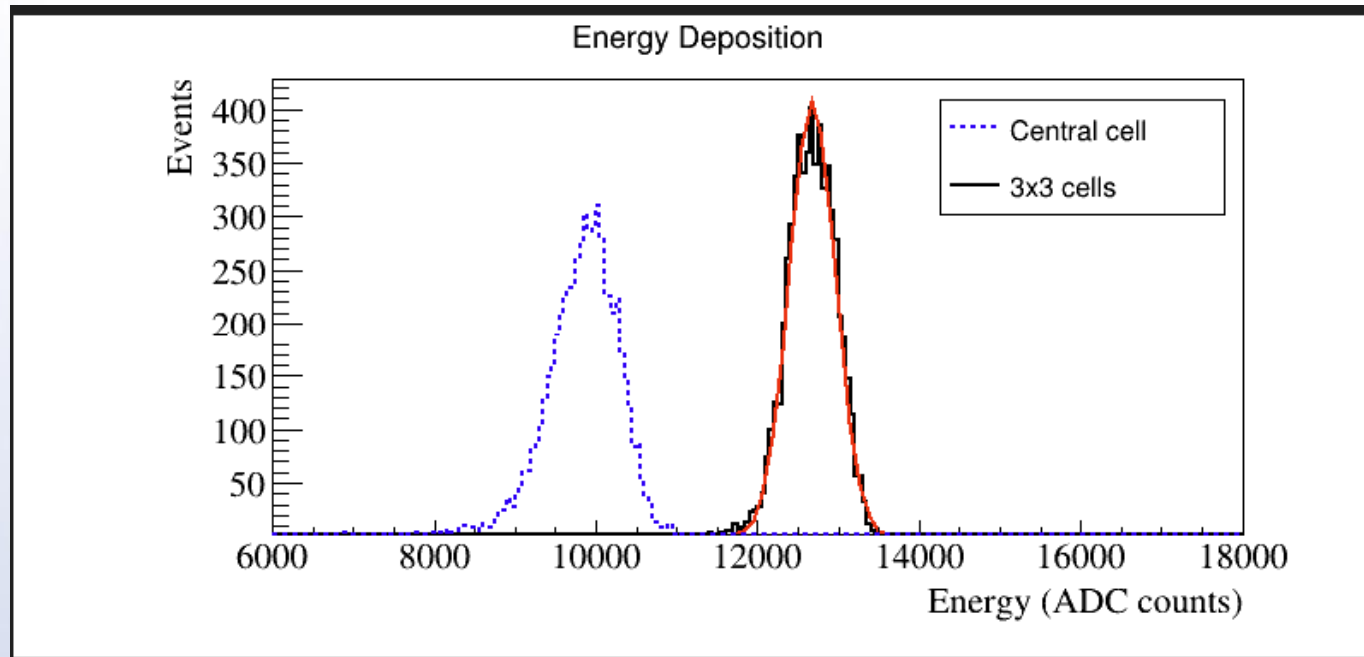
GeV positron beam test, Hall D



Central
row in
the
beam

Pulse peak amplitudes in units of flash ADC: counts as a function of the PS tile number for 9 calorimeter modules.
Each PS tile corresponds to the specific positron energy. PS tile #112 in the center of the module 5 (central cell) corresponds to about 5.5 GeV.

Preliminary results



Energy deposition in the central module 5 and in the full prototype (3x3). The energy is given in units of flash ADC counts.

ADC amplitudes, sampled with a rate of 250 MHz, are summed up in the 64 ns wide window (16 samples \times 4 ns = 64 ns)

Preliminary energy resolution computation for the 3x3 matrix $\sim 2\%$.

Additional tests to perform



- Improve prototype alignment in the beam (currently tilted)
- Acquire data at slightly different energy
- More data analysis
- Linearity
- Dynamic range