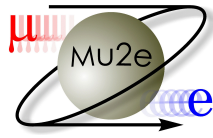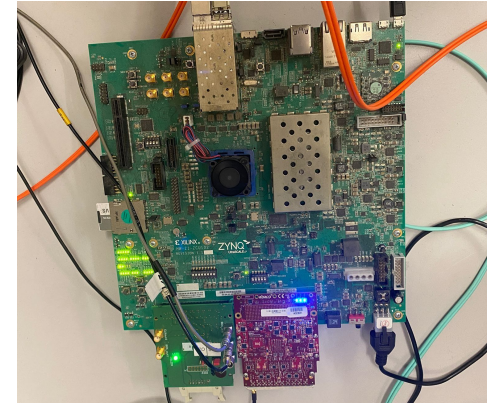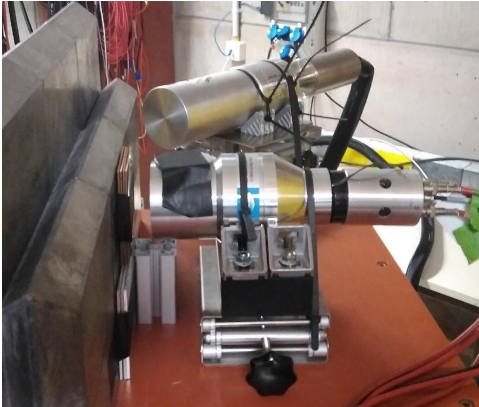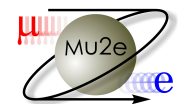# INTENSE: WP4

Development of DAQ / readout software and online algorithms for the Mu2e STM detector
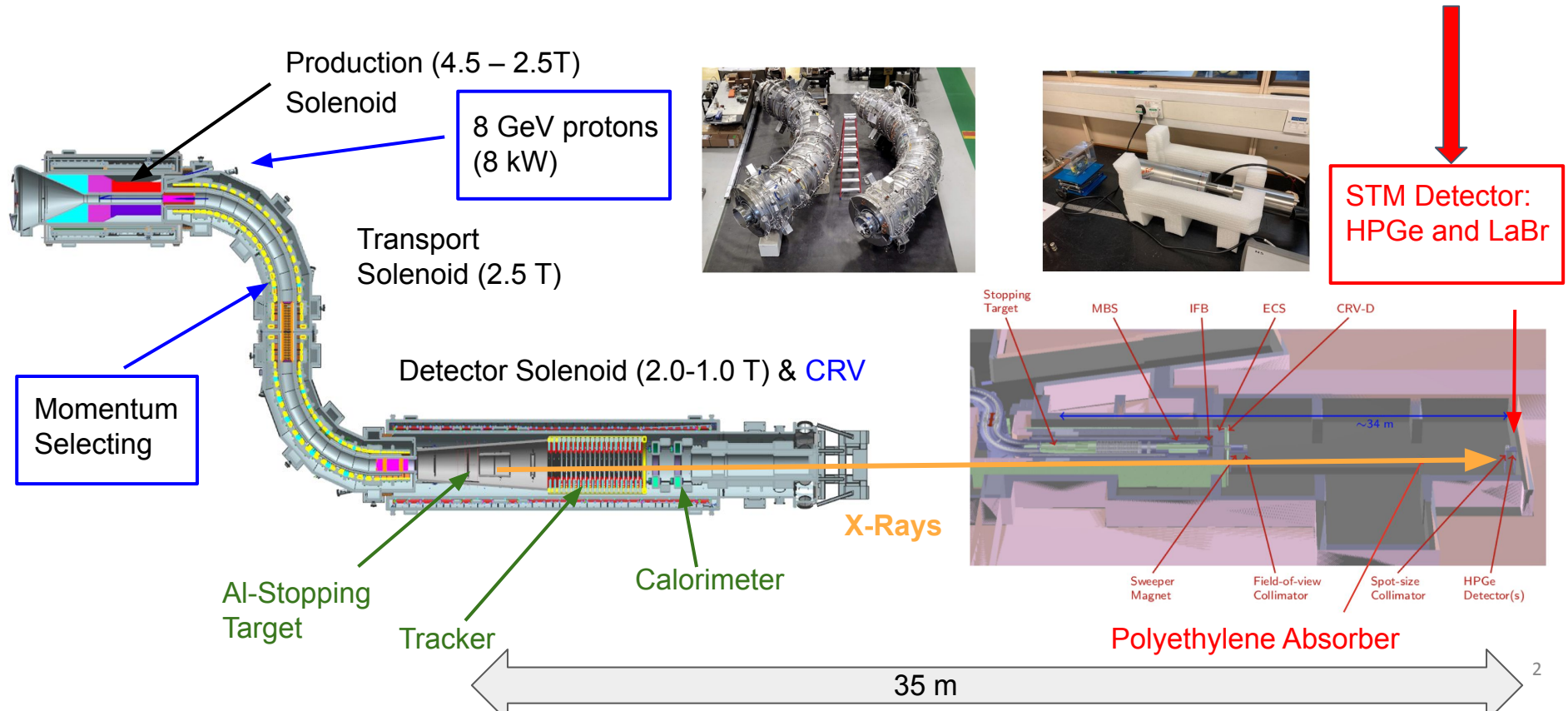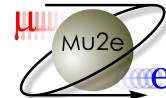
Alex Keshavarzi

My role in Mu2e / INTENSE

Leading the development of the DAQ and readout for the Mu2e STM detector

Production (4.5 – 2.5T) Solenoid

8 GeV protons (8 kW)

Transport Solenoid (2.5 T)

Detector Solenoid (2.0-1.0 T) & CRV

Momentum Selecting

STM Detector: HPGe and LaBr

X-Rays

Al-Stopping Target

Tracker

Calorimeter

Stopping Target   MBS   IFB   ECS   CRV-D

~34 m

Sweeper Magnet   Field-of-view Collimator   Spot-size Collimator   HPGe Detector(s)

Polyethylene Absorber

35 m

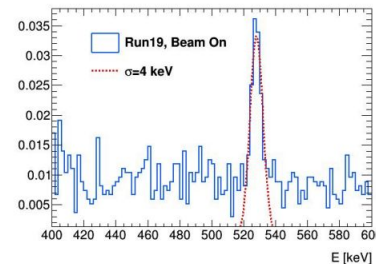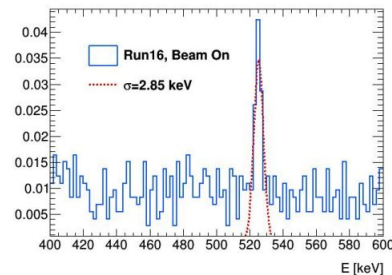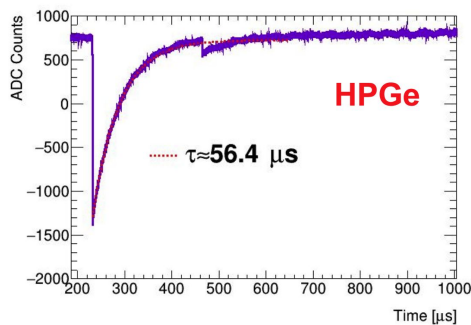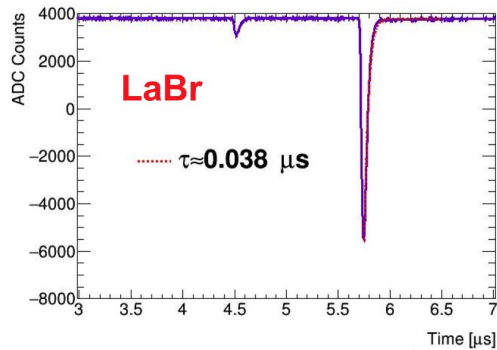# The ELBE Test Beam

Test Beam at HZDR Facility in April 2022 was a success

→ Demonstrated capability of both detectors.

→ And successfully employed DAQ hardware, firmware, software for first time.
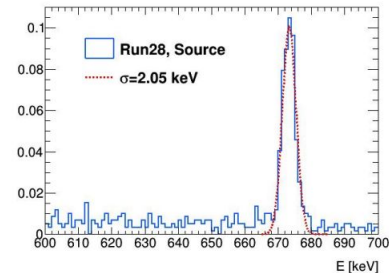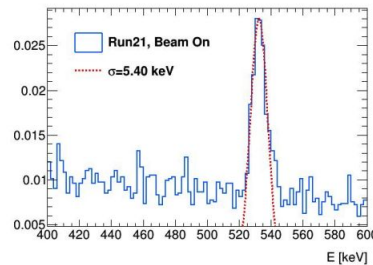
- Aim of Mu2e is to take data at 25 kHz with fluctuations upto 100 kHz.
- Showed at time of ELBE we could take and analyse data in real time up to ~ 100 kHz with expected resolutions
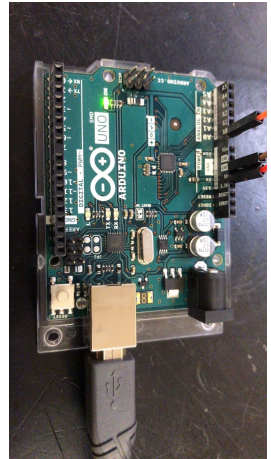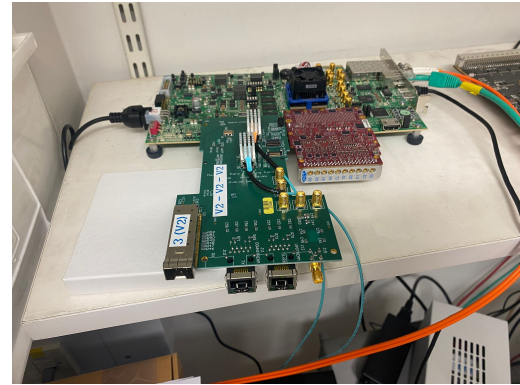
Since Elbe

Multi-threaded the DAQ socket software & optimised the UDP buffer parameters eg `SO_RCVBUF`
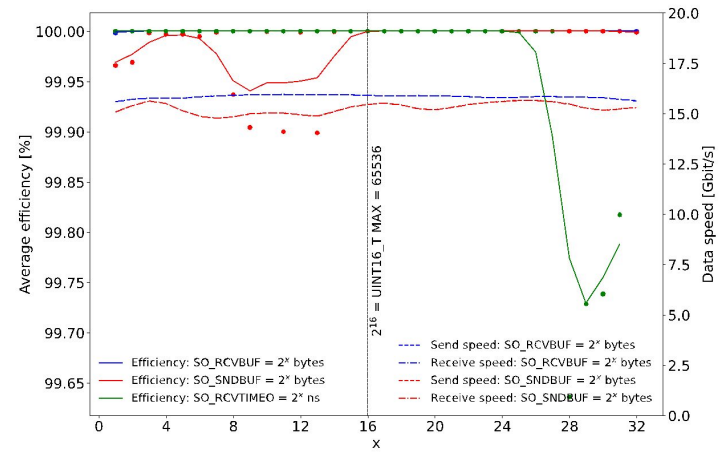
Interfaced readout with the central Mu2e-DAQ DTC (clock / triggers)

Developed a temperature readout using:
- Variable resistor + voltage divider circuit + Arduino and Raspberry Pi.
- Sends temperature readout every O(1) s to socket.

Future plans

Further integration with DTC.

Perform end-to-end test including the online (FPGA) zero suppression and pulse finding to Art files at variable rates and incorporating prescales.

Move DAQ equipment from Manchester to Fermilab in summer 2023 and integrate STM DAQ with the main Mu2e DAQ at Fermilab: secondments for Mark Lancaster, Alex Keshavarzi