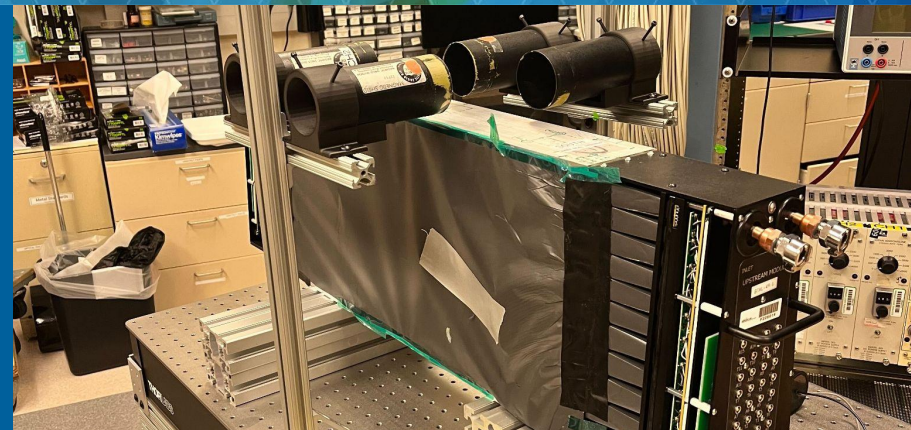BIC Meeting - R&D

March 6th, 2024
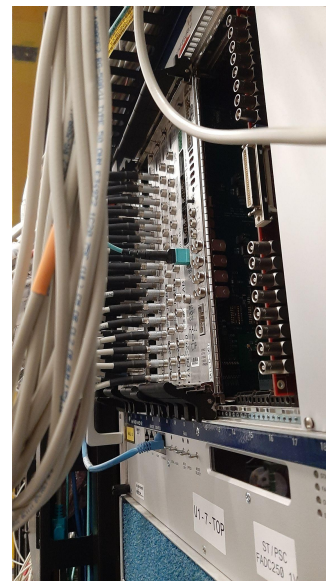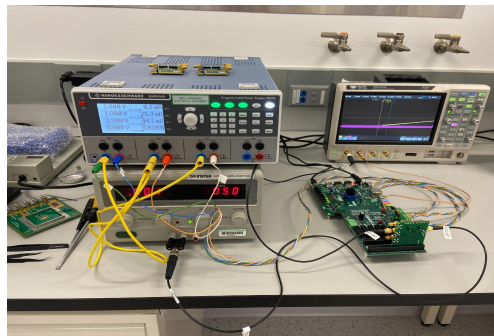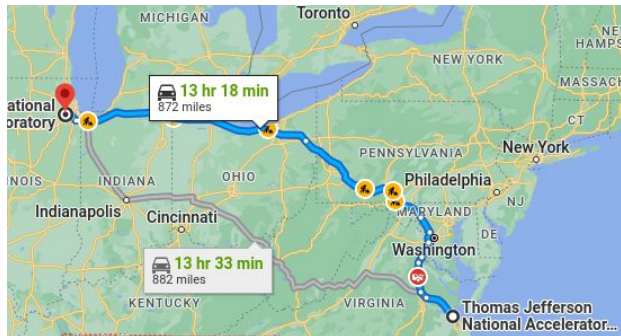
Baby BCal Bench Tests

Maria Żurek, Henry Klest
PHY, Argonne National Laboratory

FY24 R&D Plan and Deliverables
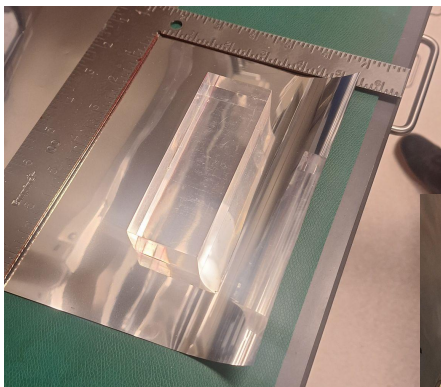
Phase I - Preparations

- Shipment of Baby BCAL, SiPM wedges, voltage distribution system, and cables to ANL/FNAL

- Final design of the system fixture

- AstroPix telescope and Baby BCAL assembly

- Performance of chip v3 QA and noise threshold scans

- Calibration with sources

- Tests of the readout with the FADCs and the CODA-based DAQ system with and without an external trigger

- Tests of the AstroPix readout system with and without an external trigger

Deliverable (M1-M3): Integrated system (Mode A) with DAQ

- Synchronization of both systems

FY24 R&D Phase I - Preparations

Argonne lab space and equipment organized

Full setup tested 01/24

- Power supplies, electronic rack with basic logic units
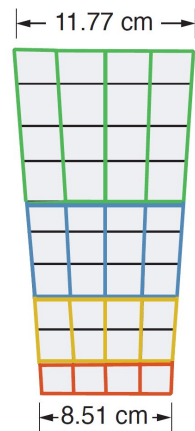- Scintillating paddles (cut, polished, wrapped) with PMTs

Baby BCal shipped 11/23
+   Missing cables 01/24

Baby BCal Bench Tests with Cosmics

Upstream-Downstream channels output tested with oscilloscope

- 75 V on Upstream (S) channels, 73.5 V on Downstream (N) channels
- All channels ok but ch S10 (wiggly baseline, large amplitude), ch S2 and S3 (smaller amplitude than N channel partners)
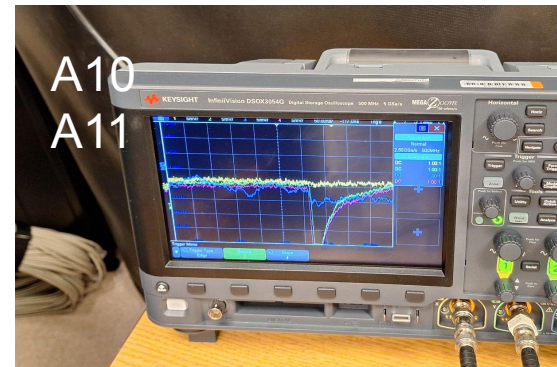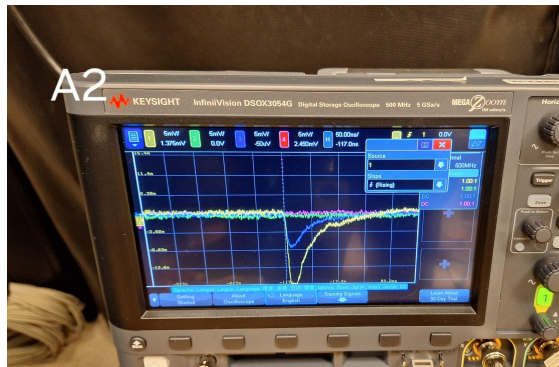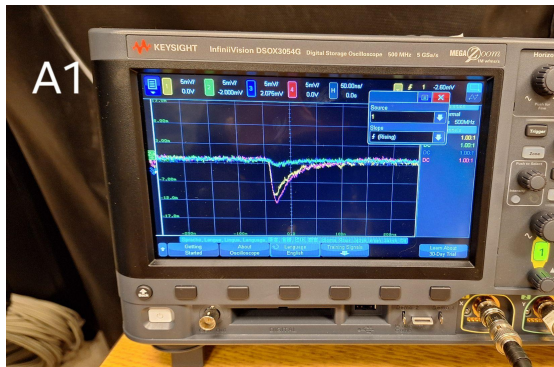- All scope traces available on google drive

11.77 cm

A12-A15

A8-A11

A4-A7

A0-A3

8.51 cm

Next steps

- Integration with the JLab DAQ system (FADCs) (Sylvester's talk)
  - Trigger from Scintillating Paddles
- Mechanical integration with AstroPix board and FNAL turntable fixture (Tom's talk)
- Integration with the AstroPix Readout in bench environment (discussion)
  - Studying signal characteristics form SiPMs and AstroPix
  - Streaming mode (matching in post analysis)
  - Can we trigger on one system (Baby BCal)?

Challenges with commissioning in high intensity environment (FNAL)
- Can we go to streaming readout? Is AstroPix timestamp resolution enough?

Example coincidence trigger from 2 paddles above and below the Baby BCal