ePIC Calorimetry Meeting

Barrel Imaging Calorimeter

In-person Workshop

Maria Żurek
05/30/2024

In-person BIC Workshop - May 14-17, 2024

https://indico.bnl.gov/event/22517/timetable/

- Day 1 (overlap with FBTF beam test): Updates on ongoing R&D and simulation work
- Day 2: Summary of the status of global, end-of-sector box, and AstroPix module interfaces and work on rev. 1 interfaces documents
- Day 3: Interfaces documentation and detailed PED work planning
- Day 4: Prototypes and test articles - planning

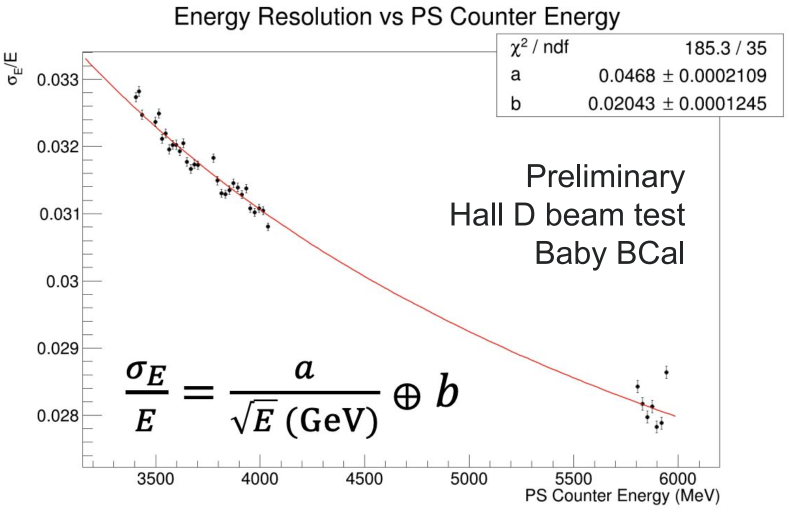
Participants

First Name	Last Name	Affiliation	Remote
Akshaya	Vijay	University Of Manitoba	R
Alexander	Bazilevsky	BNL	R
Anthony	Affolder	UC Santa Cruz	R
Aram	Teymurazyan	University of Regina	
Beomkyu	Kim	Sungkyunkwan University	
Blake	Beauchamp	Oklahoma State University	
Bobae	Kim	Argonne National Laboratory	
Chao	Peng	Argonne National Laboratory	
Evan	Van de Wall	Oklahoma State University	
Henry	Klest	Argonne National Laboratory	
Hwi Dong	Yoo	Yonsei University (KR)	
Jared	Richards	Argonne National Laboratory	
Jeongsu	Bok	Pusan National University	
Jessica	Metcalfe	Argonne National Laboratory	
Jonathan	Zarling	University of Regina	
Kevin	Bailey	Argonne National Laboratory	
KYUNG-WOOK	SHIN	UCSC: SCIPP	
Kyungseon	Joo	UConn	
Manoj	Jadhav	Argonne National Laboratory	
Maria	Zurek	Argonne National Laboratory	
Minho	Kim	Argonne National Laboratory	
Paul E	Reimer	Argonne National Laboratory	
Regina	Caputo	NASA GSFC	
Shin Hyung	Kim	Kyungpook National University	
Sylvester	Joosten	Argonne National Laboratory	
Thomas	O'Connor	Argonne National Laboratory	
Wouter	Deconinck	University of Manitoba	R
Zisis	Papandreou	University of Regina	

28 registered participants

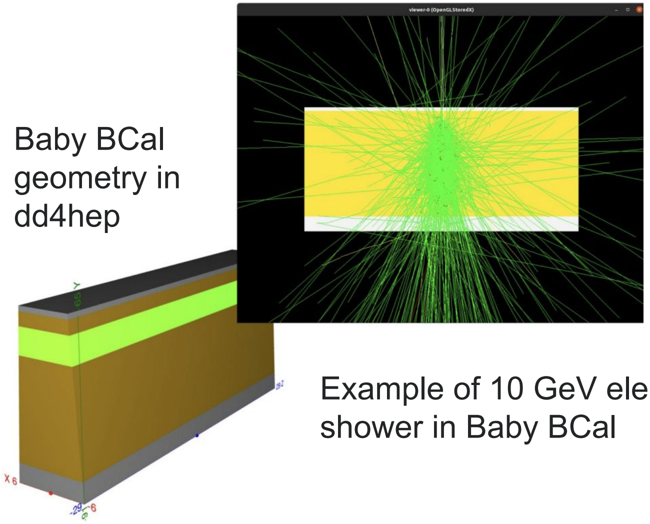
Performance and System Testing

1. Update during the BIC in Person Workshop (May 14-17) on electron energy resolution from Hall-D beam test in 2023 and simulations
   J. Zharling: https://indico.bnl.gov/event/22517/contributions/91532/
   J. Richards: https://indico.bnl.gov/event/22517/contributions/91533/



$$\frac{\sigma_E}{E} = \frac{a}{\sqrt{E}\,(\mathrm{GeV})} \oplus b$$

Preliminary
Hall D beam test
Baby BCal



Baby BCal geometry in dd4hep

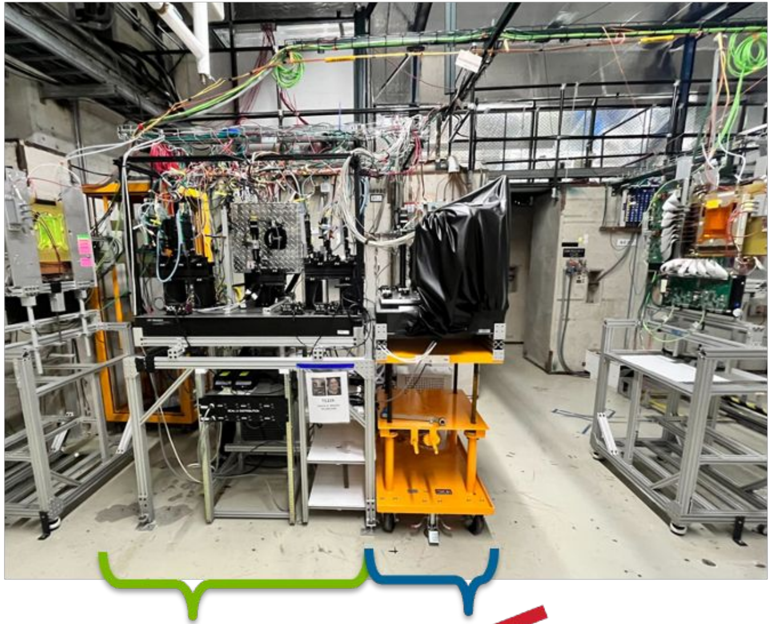
Example of 10 GeV electron shower in Baby BCal

Performance and System Testing

2. Update on ongoing ~~beam~~ cosmics test in **Fermilab Beam Test Facility (May 8-14)**

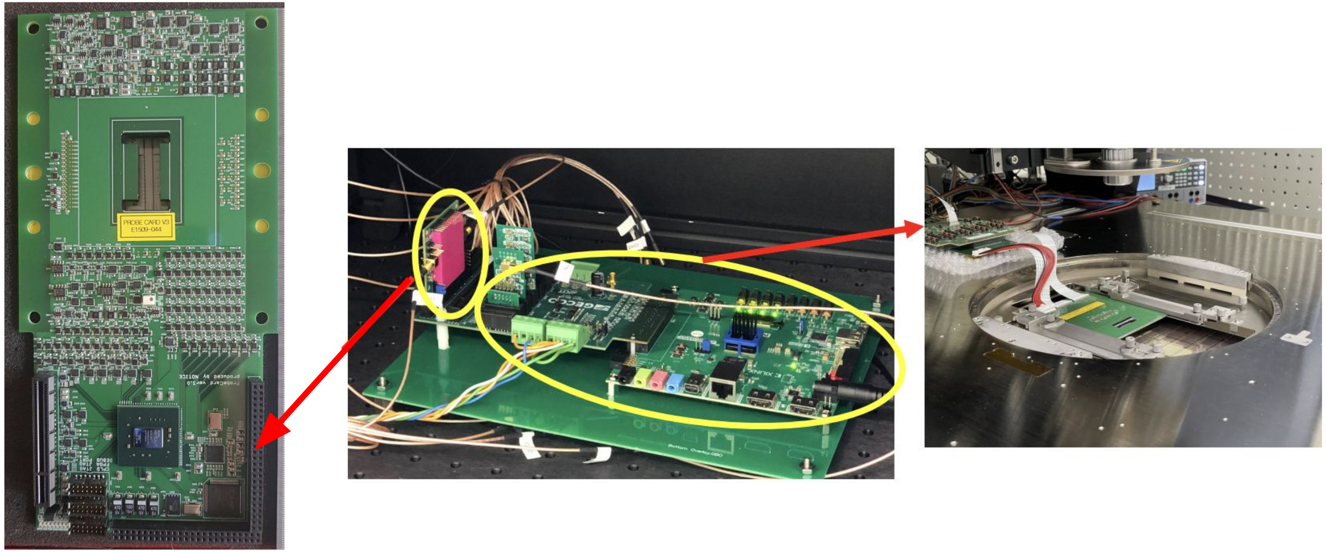
H. Klest, M. Zurek, B. Kim: https://indico.bnl.gov/event/22517/contributions/91530/, https://indico.bnl.gov/event/22517/contributions/91531/, https://indico.bnl.gov/event/22517/contributions/91624/

- AstroPix and Baby BCal (SciFi/Pb) installed and tested with **cosmics** in the FBTF
- Based on performed tests further ongoing efforts to fully readout the Baby BCal (+other FTBF detectors and cosmic paddles) in the same data stream
- **No beam delivered to FBTF so far as of today. Possibility of one week of June 12.**
- Goal:
    - Fully commission the setup with the beam including the first test of the integration between AstroPix and SciFi/Pb.
    - Benchmark response to pions.



AstroPix Wafers & Modules

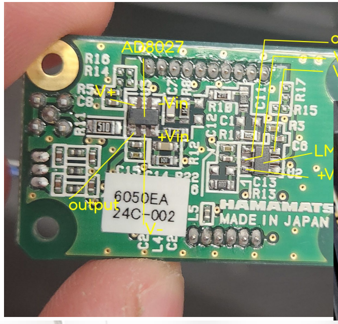
1. AstroPix v5 status (to be submitted for an engineering run in June) at the BIC in-person meeting:
   Nicolas Striebig https://indico.bnl.gov/event/22517/contributions/91071/
   - \+ Remote session on AstroPix module interfaces with KIT team
2. Developments towards wafer testing in Korea:
   Sanghoon Lim: https://indico.bnl.gov/event/22517/contributions/91072/
   1. Initial version of AstroPix v3 probe card for the carrier card only expected in a few weeks

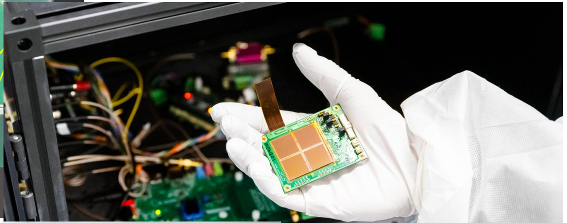


Probe card for ALPIDE

Clean Room Hands-on Work

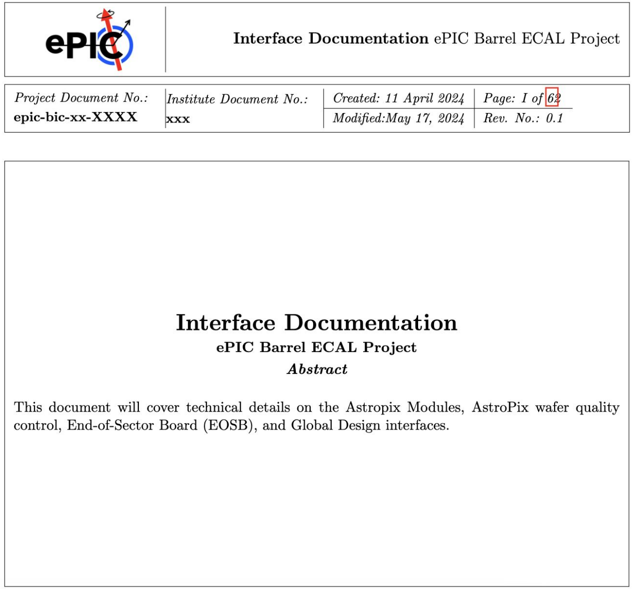
1. Opportunity for a hands-on work on AstroPix Firmware and quad-chip board (Bobae Kim, Amanda Steinhebel, Manoj Jadhav) and SiPM readout board (Henry Klest, Maria Żurek, Aram Teymurazyan)





Sector Design, Mechanics and Integration

1. Extensive work on finalizing **revision 1 of the interfaces document for BIC** over the last few months, with a series of topical meetings and writing sessions during the in-person BIC Workshop.
2. **Freezing interfaces** as PED funds become available to some of our collaborators will allow teams to **focus on sub-component designs** with clearly defined envelopes and conditions



Interface Documentation ePIC Barrel ECAL Project

Project Document No.: **epic-bic-xx-XXXX**	*Institute Document No.:* xxx	*Created: 11 April 2024* *Modified:May 17, 2024*	*Page: 1 of 62* *Rev. No.: 0.1*

Interface Documentation

ePIC Barrel ECAL Project

Abstract

This document will cover technical details on the Astropix Modules, AstroPix wafer quality control, End-of-Sector Board (EOSB), and Global Design interfaces.

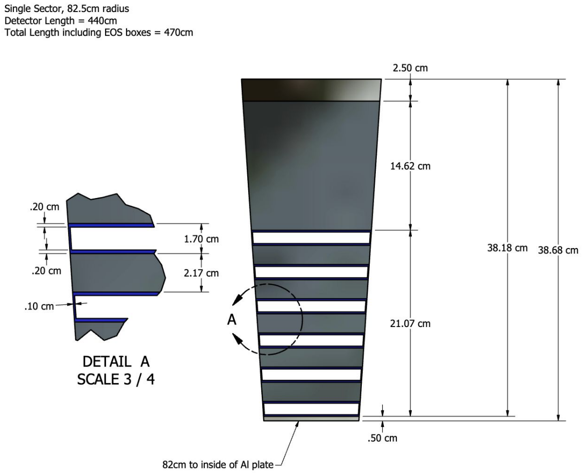


Figure 2: Single Sector, End View. Sectors build of the layers of scintillating fibers embedded in lead shown in gray and 6 slots for AstroPix layers shown in white.

End of Sector Box

1. Finalizing mechanical interfaces for the designs of SiPM and HGCROC PCB, end-of-tray card (AstroPix FPGA), cooling, lightguides, connectors, etc.

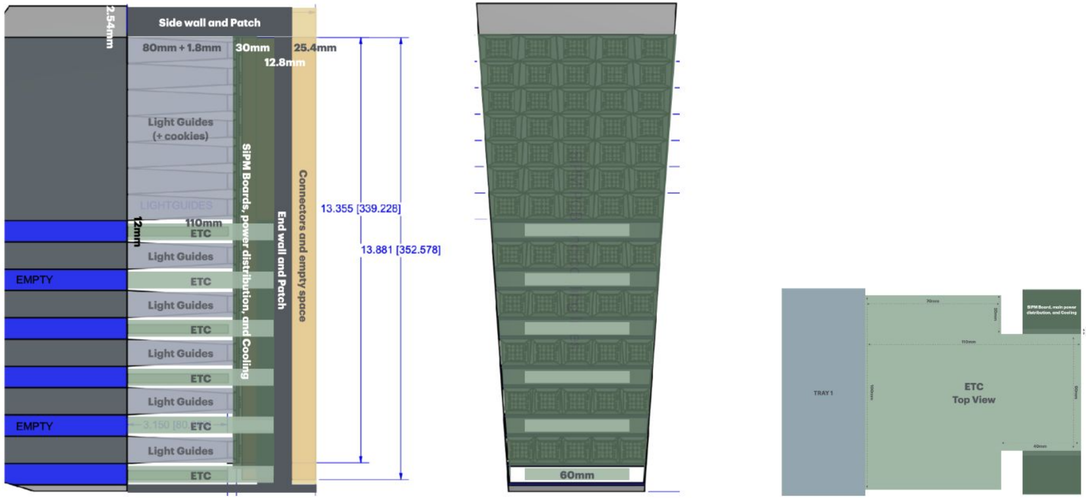
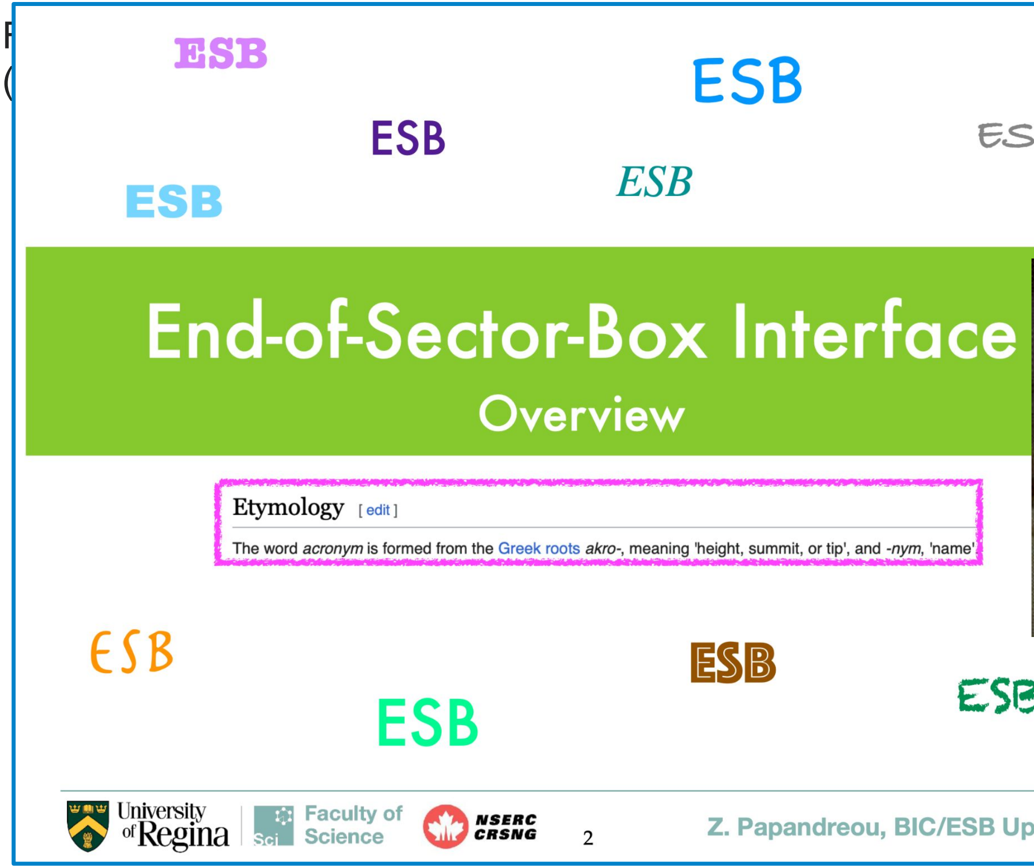


Figure 11: Napkin sketch of the mechanical envelopes for the ESB. Left: Side view in the middle of a sector. Center: Rear view cutout at the SiPM PCB Right: Top view of the AstroPix readout FPGA. **TODO: replace with engineering drawings**

End of Sector Box (EoSB → ESB)

1. F C PCB, end-of-tray card
(



ESB

ESB

ESB

ESB

ESB

ESB

End-of-Sector-Box Interface

Overview

Etymology [edit]

The word *acronym* is formed from the Greek roots *akro-*, meaning 'height, summit, or tip', and *-nym*, 'name'.

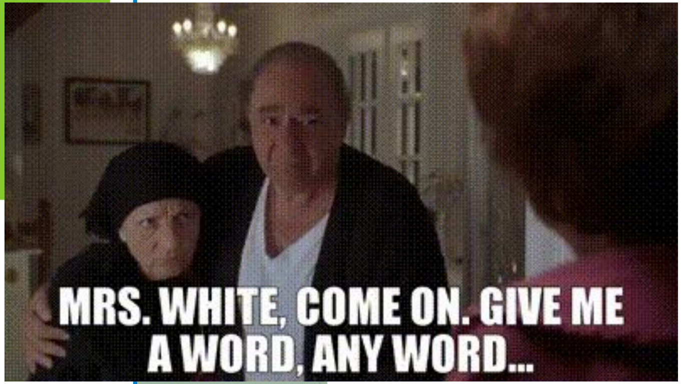
ESB

ESB

ESB

ESB

University of Regina | Faculty of Science | NSERC CRSNG 2 Z. Papandreou, BIC/ESB Update



de view in the middle
the AstroPix readout

Time to buzz away!
Thanks for listening!

Official 3rd BIC Workshop mascot(ssss)