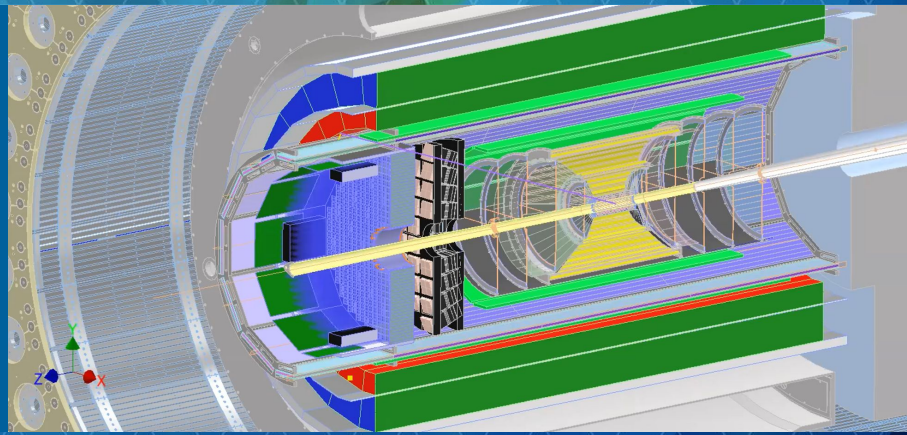
BIC ST Meeting

Nov 26, 2024

System Testing



Maria Żurek

eRD115 - Barrel EM Calorimeter

- First year of R&D which combines Pb/Scifi technology with a high-precision position detector(Astropix).
- Despite many problems (funding, test beam) FY24 R&D progressing very well.
- Successful integration of Astropix and BabyCal has been achieved on the readout side adding one Astropix board to the DAQ stream in the first phase, and two boards in parallel in the second phase.
- Not all tasks completed - integration of BabyCal and Astropix with the short Pb/Scifi sections (SFils): fundamental to clarify needs for final detector configuration (#position sectors, π/e, π^0/γ disc.)

- First results from latest test beam at FTBF but not enough details on π/e, π^0/γ separation.
- Did not see results on BabyCal energy resolution and response from ANL 2023 test beam.
- No assessment of the efficiencies of the AstroPix ASICs shown.
- In general the AstroPix development may need further scrutiny.

- We commend the team for the work done since summer 2023, and we provide our full support for an extension of the R&D period to FY 2025. (Not clear if this should be supported by R&D or PED?)
- Extend the R&D to horizontal arrangements of AstroPix to mimic better the situation in the experiment. Check reproducibility of layer production.
- Carry out tests on the efficiency of the AstroPix ASIC with the multilayer setup.
- Confront early AstroPix performance with specs. → done for the PRD2 review
- Data-simulation comparison should still be completed. Similarly, linearity tests should be carried out to decide an eventual selection of other SiPM models.
- Keep working on detector mechanical integration and cooling., and robust procedures for detector construction.

π^0/γ measurement cannot be done at FBTF

π/e separation from **SciFi only**, presented

FY23 beam test took place at Hall D and the results have been presented during the talk

Issue with FIFO buffer in v3, can we even do that with v3?

Test with 9 chip module. Same limitation from the FIFO buffer

PED

- Data/MC work almost done (Beam Test paper)
- Linearity simulated
- Measurement with higher energy

Testing Tasks - Review

- Integration with SFILs and full integration with AstroPix - beam/cosmics(?)
  - Streaming (AstroPix with external clock)
  - Readout with HGCROC
  - Backup with CODA-based JLab DAQ(?) with external clock
- Assessment of efficiency in multilayer of AstroPix - beam/source
  - Currently overshadowed by the FIFO buffer (Maybe can do that for a subset of pixel?)
- SciFi/Pb integration with a module/quad chip - beam/cosmics
- Assessment of e/pi separation in full system - e/pi beam required
- Non linearity tests (done at FBTF for 4/8/8/10 GeV) - e beam required

Testing Tasks - Bench stations

Subcomponents (small scale) test stations

- Fiber testing (B102)
  - Attenuation measurement
- SiPM testing (B102) + proper irradiation studies
  - Noise/characteristics measurement
  - Analysis by Tegan of GlueX data
  - Irradiation setup at Hall C
- Baby BCal with SFILs to test with cosmics (B102)
  - nphe/GeV for muons measurement
  - AstroPix/Baby BCal synchronization
- AstroPix setup for calibration with sources (B102) - done