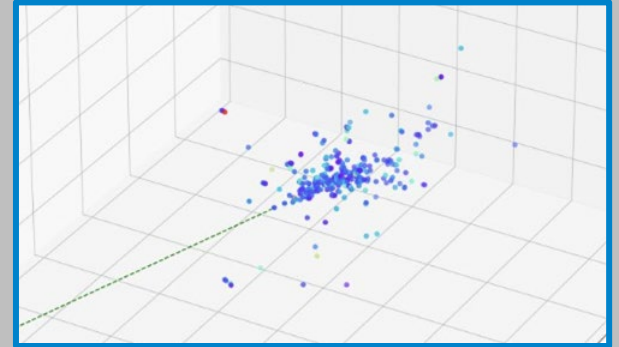
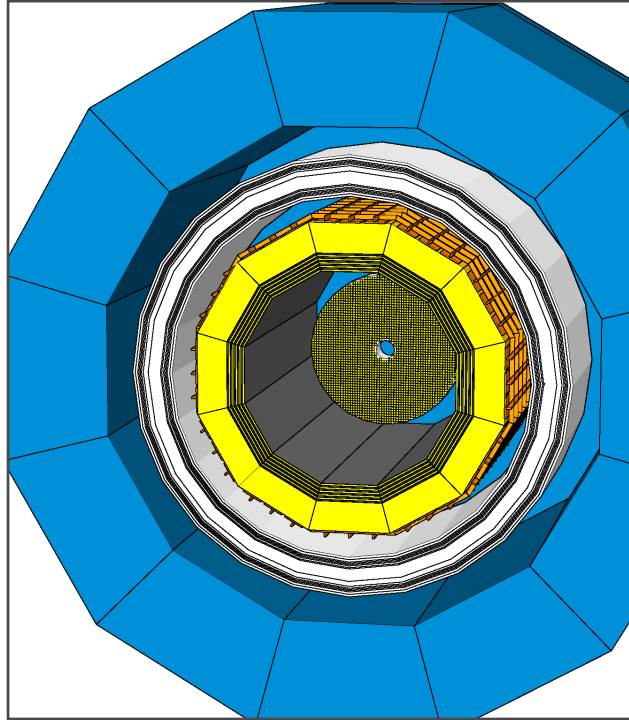


Imaging Barrel Ecal Geometry in EPIC Simulation



C. Peng, M. Żurek

Imaging Barrel Calorimeter



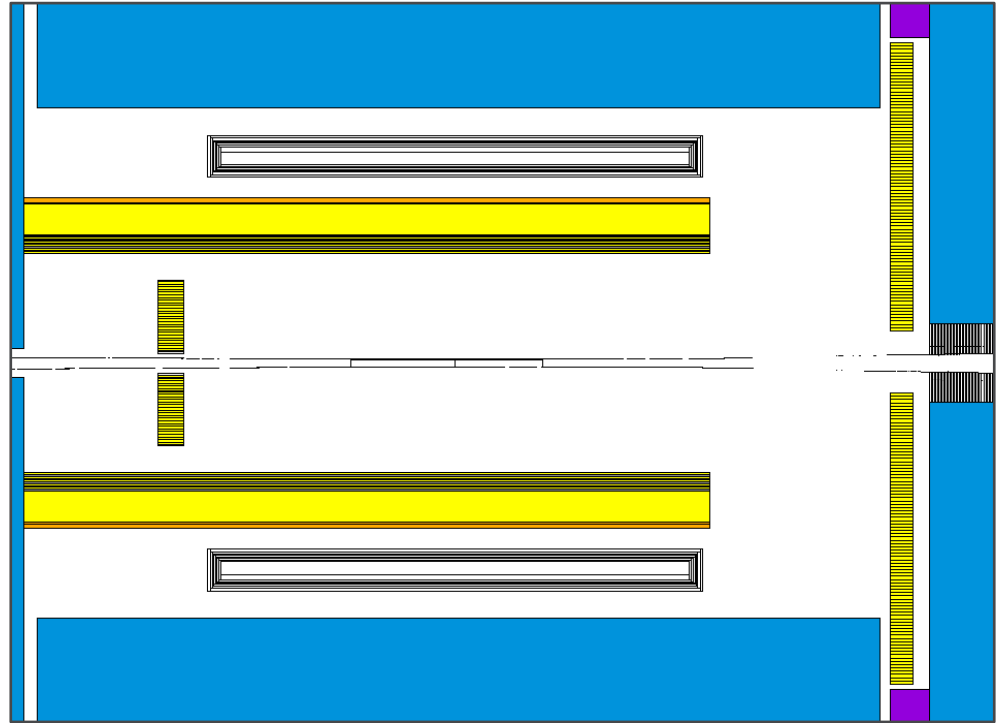
What's in the EPIC simulation now:

- ✓ 6 layers of AstroPix
 - Monolithic silicon detector
 - 0.155 cm + 1 cm of air = 1.155 cm per layer
- ✓ 5 “sandwich” layers and 1 outer layer of Pb/ScFi
 - Energy measurement and radiator
 - “Sandwich” layer ~1.6 cm per layer
 - Outer layer ~24.5 cm, adds to ~21 X_0
- ✓ Outer support structure made of steel ~5 cm
- ✓ 12 staves

Imaging Barrel Calorimeter

Imaging barrel ECal dimensions:

- ✓ Length: 525 cm
- ✓ Center offset: -67.5 cm
- ✓ Inner radius: 83.5 cm
- ✓ Total thickness: ~43.5 cm



AstroPix Layers

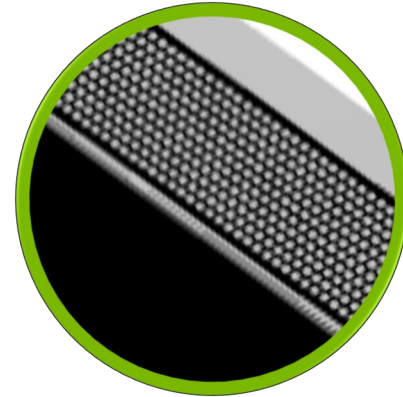
- 6 layers of AstroPix
 - Silicon
 - Electronics & cooling plates
 - Glue & support structure
- Simulation output
 - 0.5 x 0.5 mm² segmentation
 - Energy deposit sum in each segment
 - Noise suppression of 4 sigma ($\sigma \approx 5$ keV)

```
<slice material="Silicon" thick  
<slice material="Silicon" thick  
<slice material="Copper" thick  
<slice material="Kapton" thick  
<slice material="Epoxy" thickn  
<slice material="CarbonFiber"
```

Pb/ScFi Layers

- Scintillating fibers embedded in lead
 - Built geometry for each fiber
 - Plastic scintillator
 - Lead

- Simulation output
 - Energy deposit sum in each fiber
 - Signal sum of fibers in $\sim 2 \times 2 \text{ cm}^2$ grid in digitization



Ongoing Development

- Before this simulation campaign (Feature freeze at 10/03/2022)
 - Match the number of staves with DIRC (24 staves)
 - Z-segmentation for fiber (hits separation study with waveform analysis)
 - Replace lead with lead-glue mixture

- Planned development for future campaigns
 - Geometry with actual Astropix chips
 - Performance improvements for Pb/ScFi
 - Realistic waveform signals and noises
 - Clustering algorithm improvements
 - Etc..