

eRD111 proposal & LBNL report

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October 10, 2022

EIC SC Meeting

General info

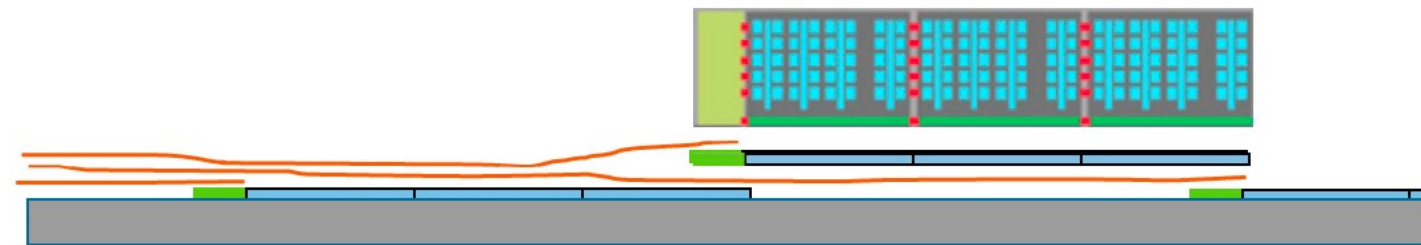
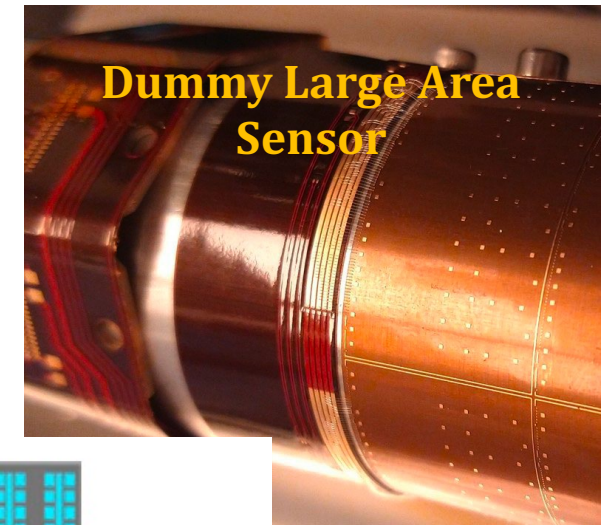
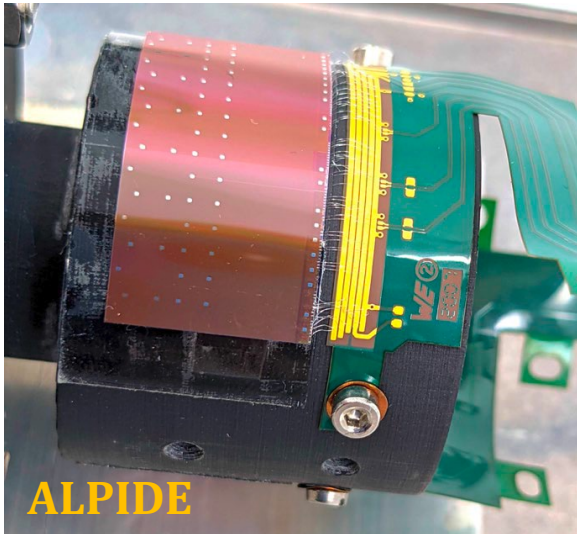
- CD2/3A is back on track for mid 2024
- We've lost a year in R&D progress
- FY23 proposals should try to mitigate delays
 - Shorten FY22 milestones, catch up
- [eRD104](#) & [eRD111](#)
 - Report & proposal
- [eRD113](#)
 - New proposal on sensor development
- All 3 proposals submitted last week
- [EIC Project R&D DAC meeting Oct 19 - 21](#)

eRD111: Silicon tracking (no sensors)

- Modules – INFN, UK
- Barrel & discs – LBNL, LANL, ORNL, UK
- Mechanics, infrastructure, cooling – LBNL, LANL, ORNL

Modules

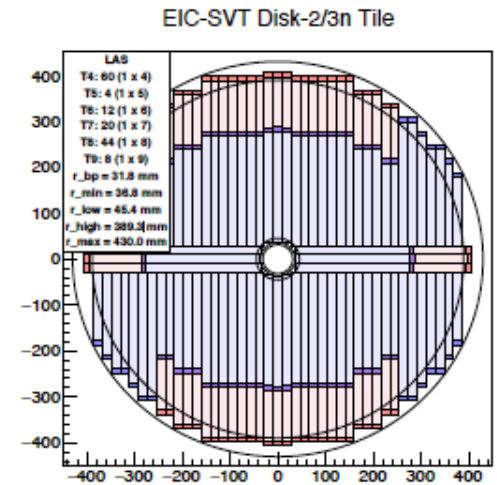
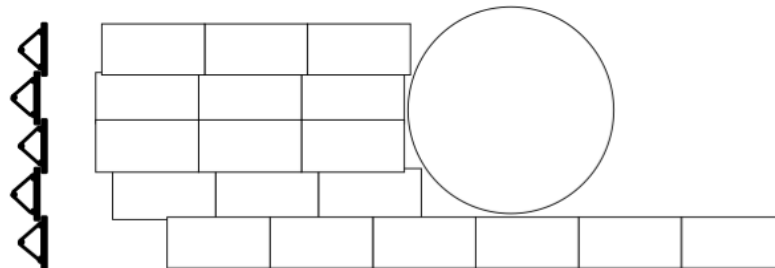
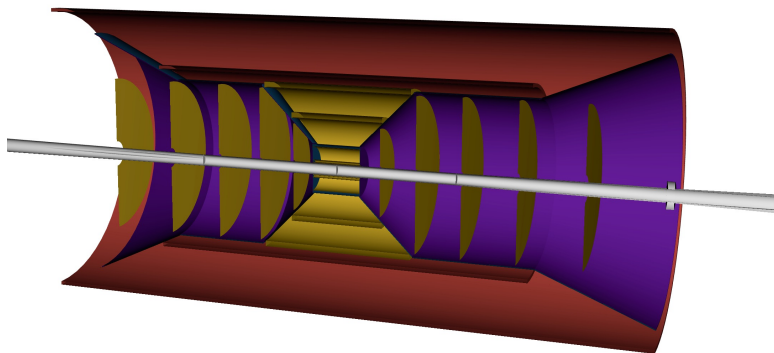
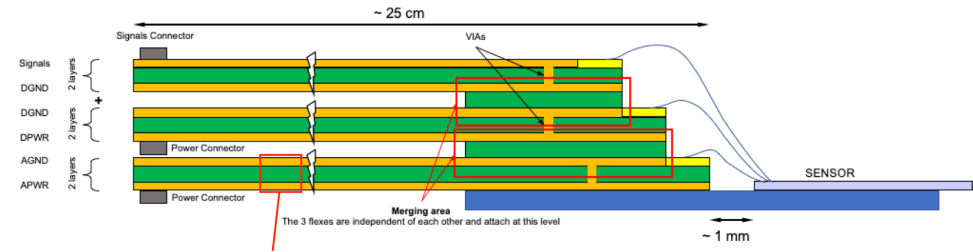
- Report on optimized sensor dimensions for EPIC based on measured yield of ER1
- Studies of bending and interconnection



Traditional module: support+FPC+sensor

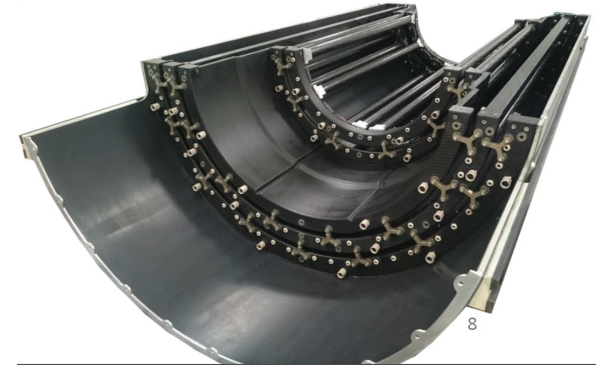
Barrel & discs

- Vertex layers
 - Conceptual design, including possible new support structures
 - Prototype pieces: carbon foam longerons/rings, carbon fiber support for wire bonding near periphery
- Stave & discs
 - Conceptual design – seriously consider stave-like disc design
 - Prototype pieces & (possible) mechanical & thermal tests



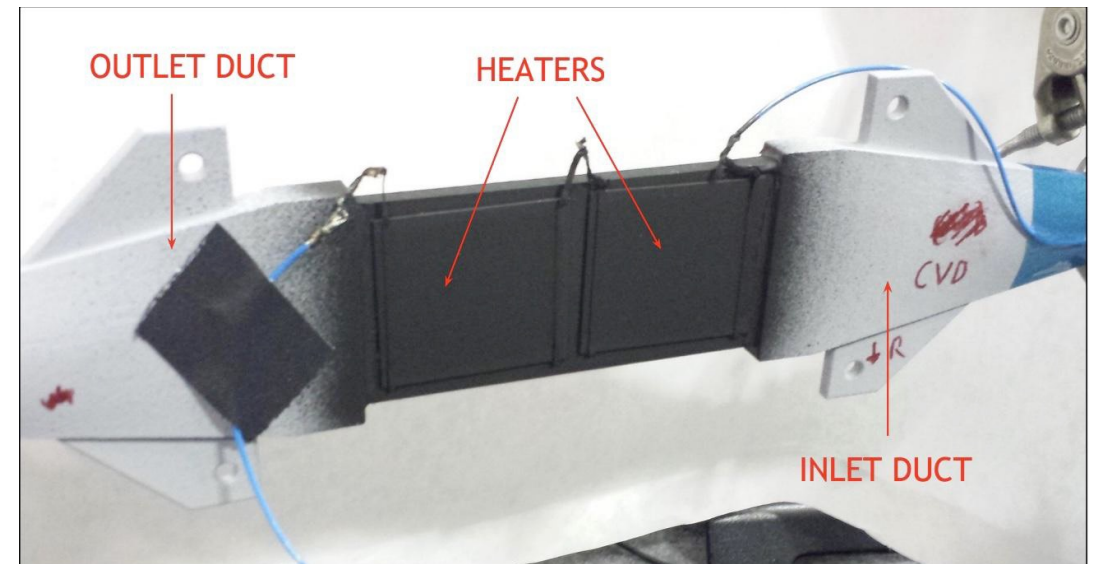
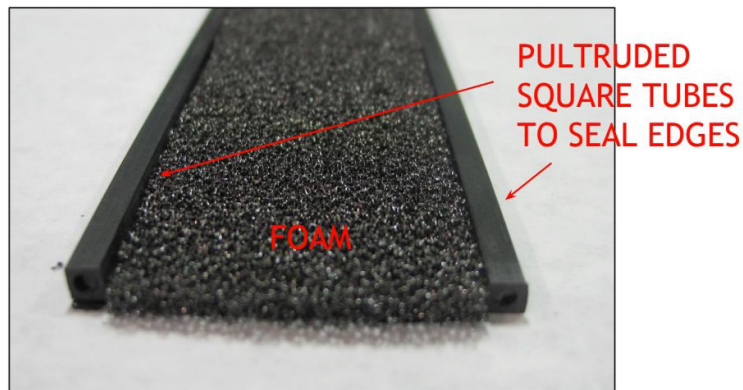
Mechanics, infrastructure, cooling

- Updated CAD model of tracker
- Analysis of cooling options
 - Build on summer work for air
 - Add vertex cooling studies - EPIC vertexing is different enough from ITS3 that it should be a separate R&D.
 - Beam pipe bake out
 - Add liquid cooling options
 - Particularly important for periphery ($900 \text{ mW/cm}^2 - 4000 \text{ mW/cm}^2$)
- Conceptual designs for detector support structures
 - Prototype pieces with (possible) mechanical & thermal tests



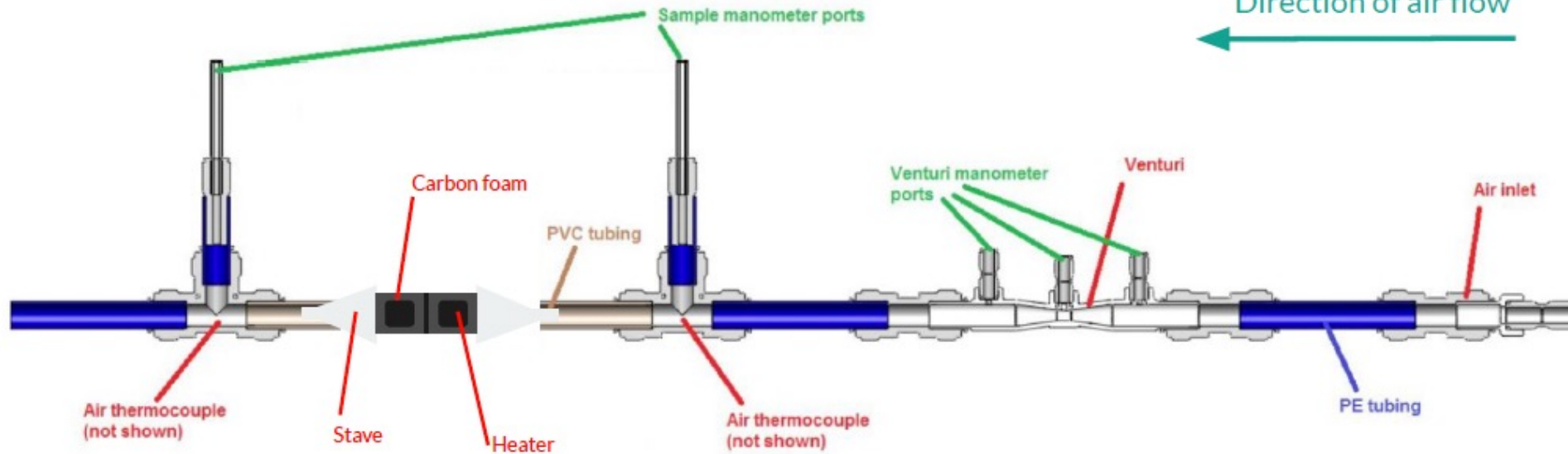
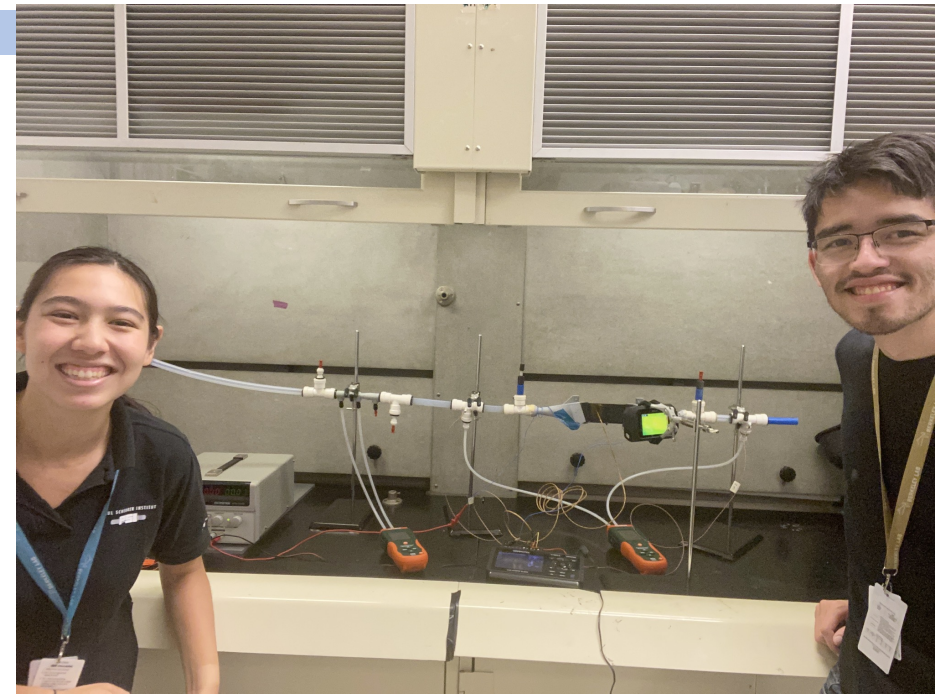
LBNL R&D summer project

- Testing air cooling with carbon foam
- Various “staves” with different foams & different thicknesses
- Measure ΔT & ΔP



Air cooling: lab setup

- Work done by LBNL postdoc & UC Berkeley grad & undergrad students
- Preliminary results to be shown at DNP



Air cooling: upcoming plans

- Increase the air flow
- New heater for more realistic power distribution
 - Periphery & matrix
- Stave & disc “prototype” pieces
 - Size & shape of current geometry
 - Different carbon fiber & foam thicknesses
- New way to direct air?

