Update & Plans

Miguel Arratia,

California EIC consortium meeting,
08/21/23 @ UC Berkeley

UCR EIC team in 2023

Undergraduate students;
Luis Garabito (now at MSU), Miguel Rodriguez, JiaJun Huang (upcoming grad UCR)
Peter Carney, Mia Macias, Samir Kulkarni, Bruce Bagby (graduated),
Youseff Abdelkadous

Graduate students:
Ryan Milton, Xilin Liang, Sean Preins

Postdocs: Weibin Zhang (0.5 FTE) [MRPI] & STAR in Barish's group
Bishnu Karki (0.5 FTE) [DOE AI] & STAR in Barish's group
Sebouh Paul (0.5 FTE) [JLab EIC] & CLAS12 in Arratia's group

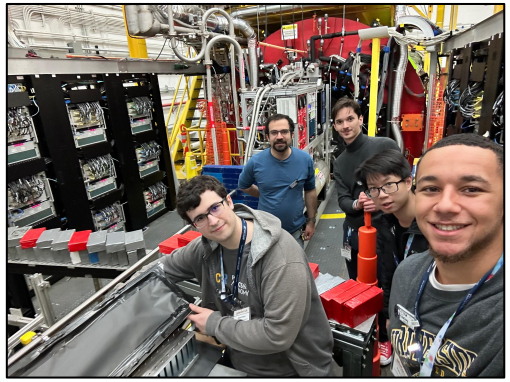
Faculty: Barish, Long, Seto, Arratia

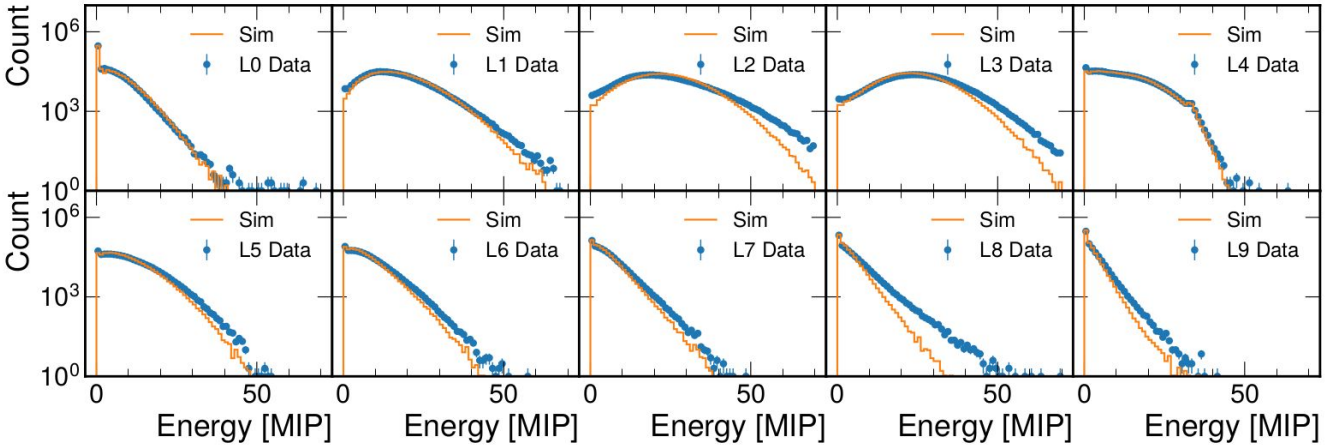
Outline

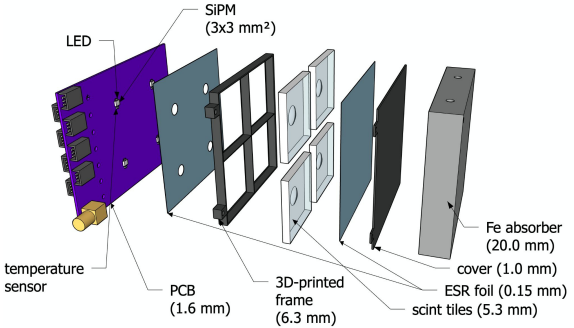
- Calorimeter Insert updates
- A proposal for a insert-like ZDC
- A few-degree calorimeter
- Fission @ EIC

Status of 1st Calorimeter Insert Test Beam Paper

- Refined analysis, calibration, and improvement of sims since our last mtg.
- Spearheaded by lead editor Weibin Zhang (postdoc) and Sean Preins (grad)
- Results to be submitted to arXiv very soon (as detailed by Sean's talk today)

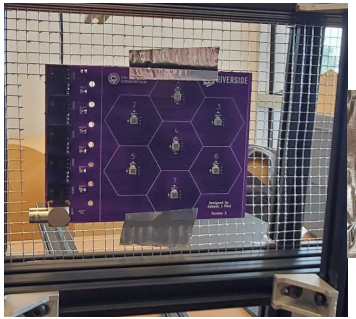


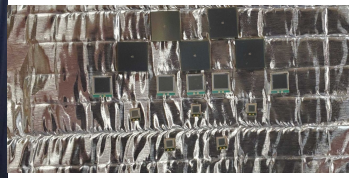


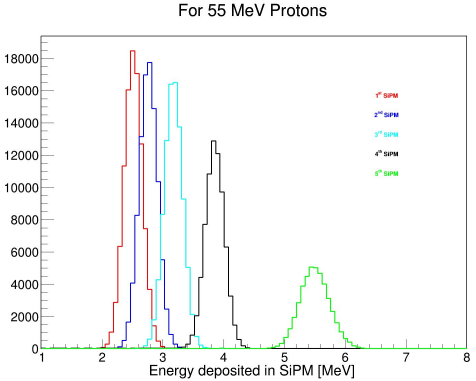


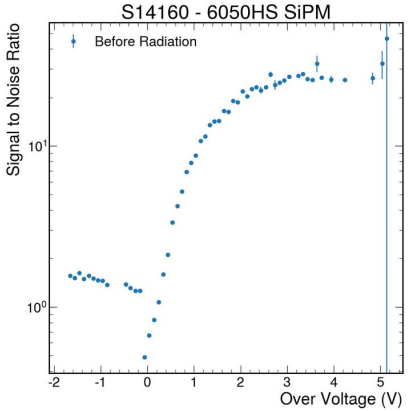
SiPM irradiation test at the 88” *unfortunately canceled due to cyclotron shutdown.

- Team led by Barak prepared testbeam setup and simulations.
- Analysis code for testbench measurements and analysis was developed









other members present but not shown in picture: Kumar, Weibin, Barak (lead)

Insert building block studies is published in JINST

IOPscience Journals Books Publishing Support Login

Journal of Instrumentation

- Most studies already presented in UCLA mtg

PAPER

Studies of time resolution, light yield, and crosstalk using SiPM-on-tile calorimetry for the future Electron-Ion Collider

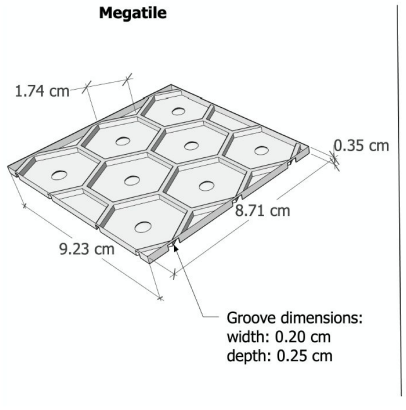
Miguel Arratia[1,2], Luis Garabito Ruiz[1], Jiajun Huang[1], Sebouh J. Paul[1], Sean Preins[1] and Miguel Rodriguez[1]

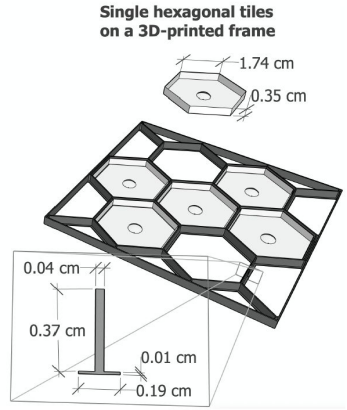
Published 26 May 2023 • © 2023 IOP Publishing Ltd and Sissa Medialab

Journal of Instrumentation, Volume 18, May 2023

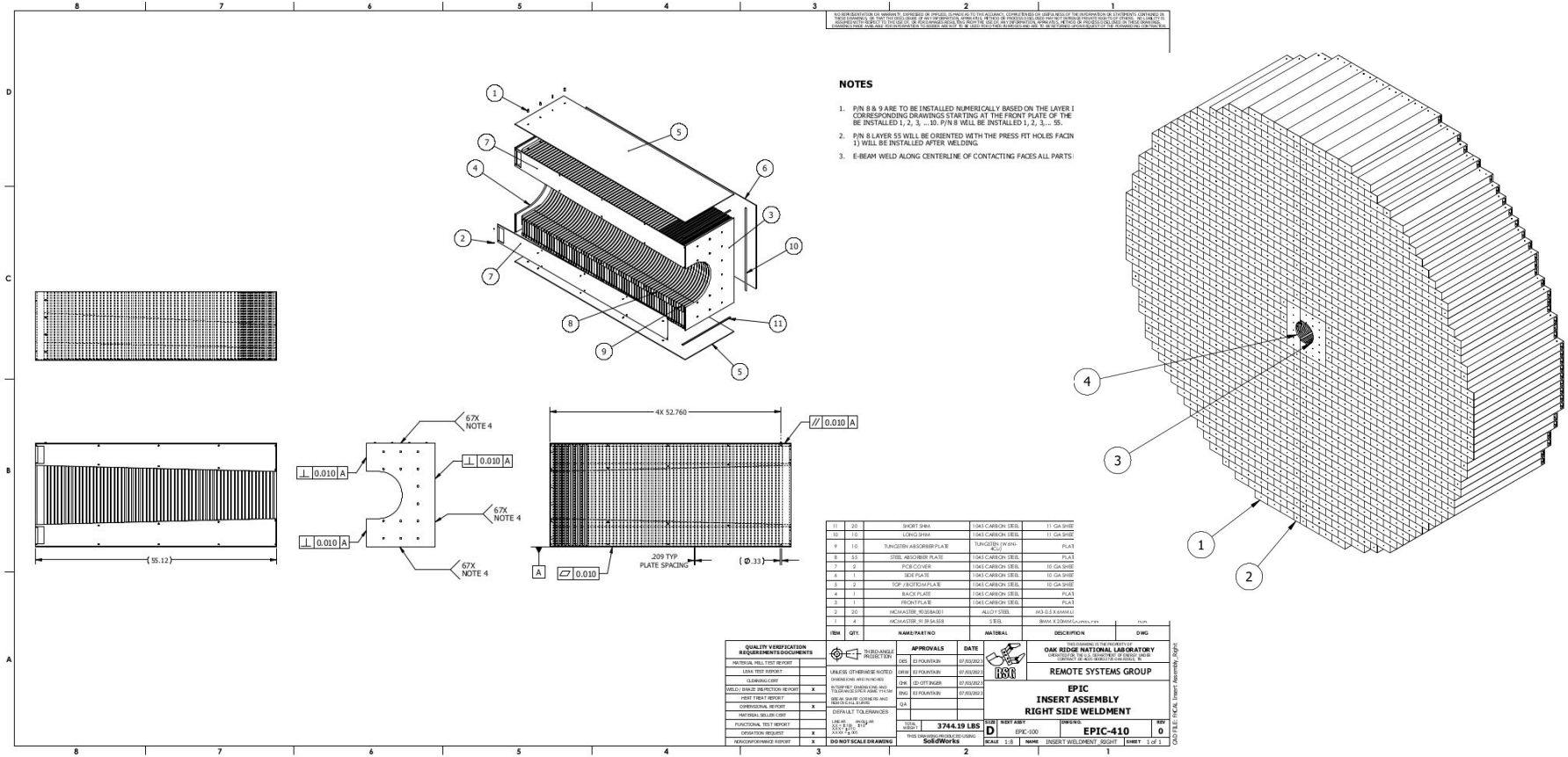
Citation Miguel Arratia *et al* 2023 *JINST* **18** P05045

DOI 10.1088/1748-0221/18/05/P05045

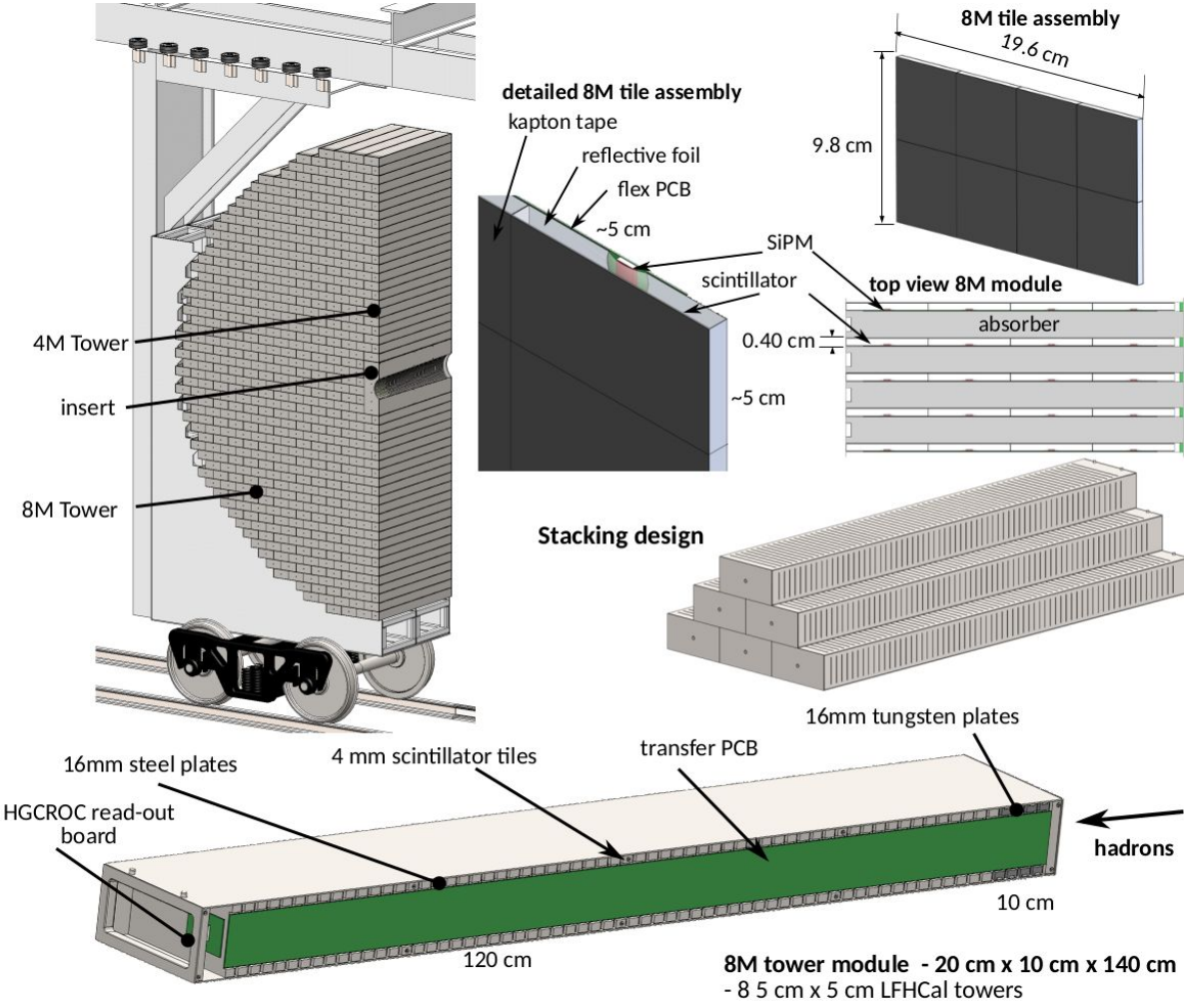




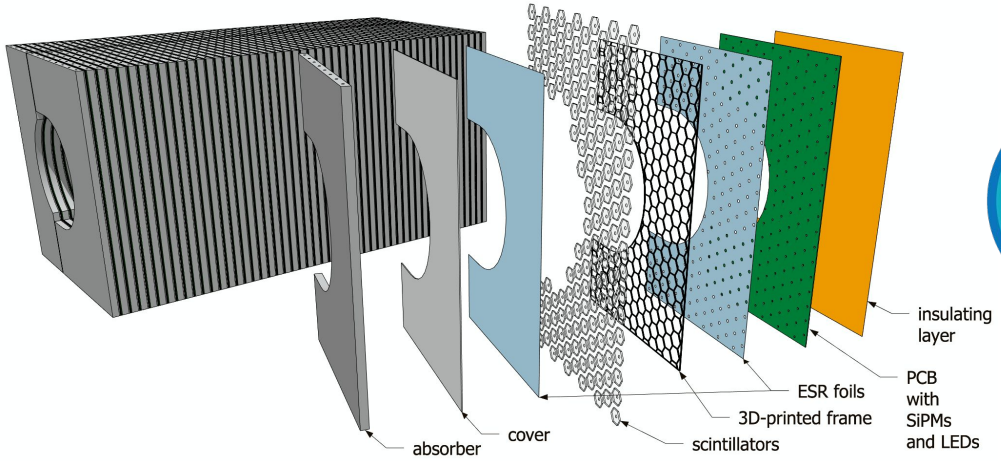
The CALI subsystem is fully integrated in engineering design, project cost & schedule, ePIC collaboration structure, official simulations, etc



The Calorimeter Insert is the first subdetector
(and technology)
not included in any proposal that is currently part of the ePIC baseline



“We will design these [detectors] and attract construction funds to California”



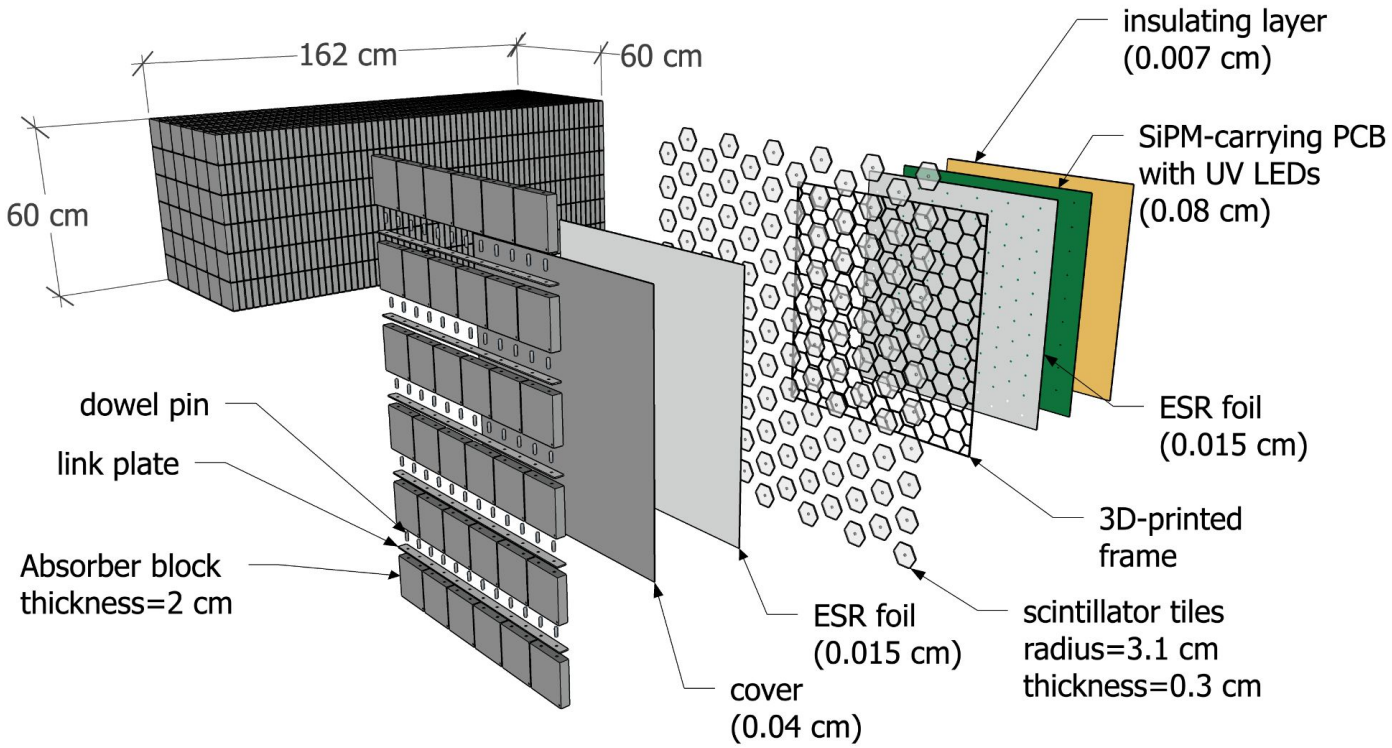
CALIFORNIA EIC CONSORTIUM

UC RIVERSIDE

UCLA

An insert-like Zero Degree Calorimeter

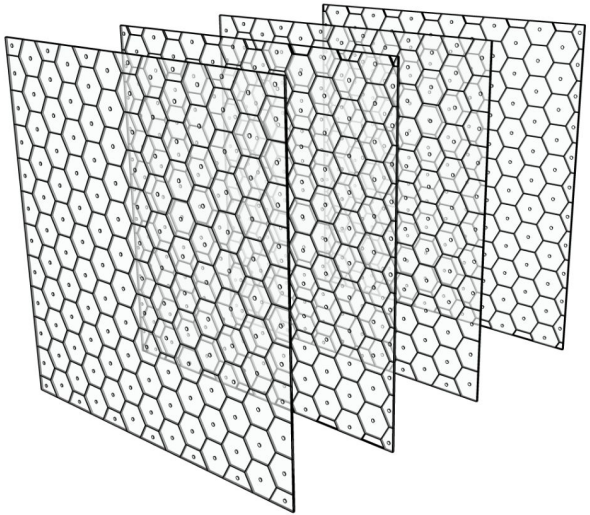
High-granularity & low cost (reused STAR HCAL blocks)

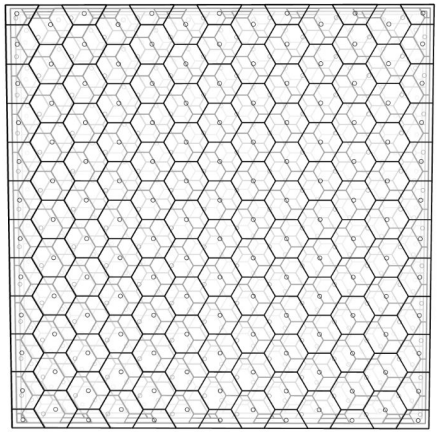


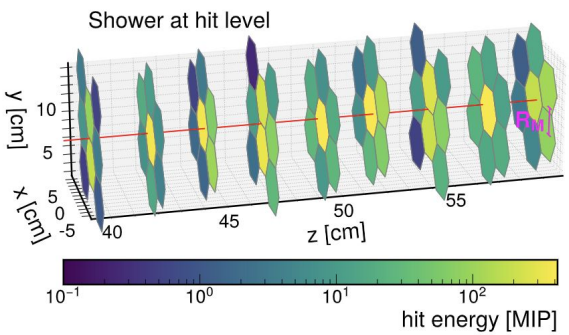
Staggering and the HEXPLIT algorithm

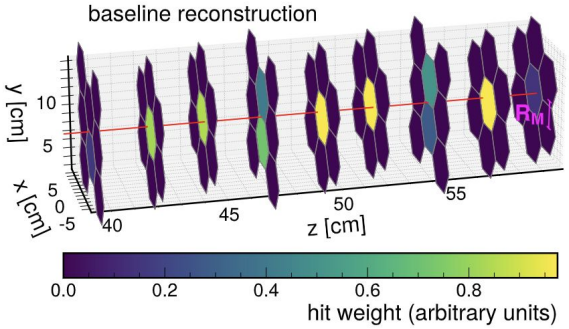
arXiv:2308.06939

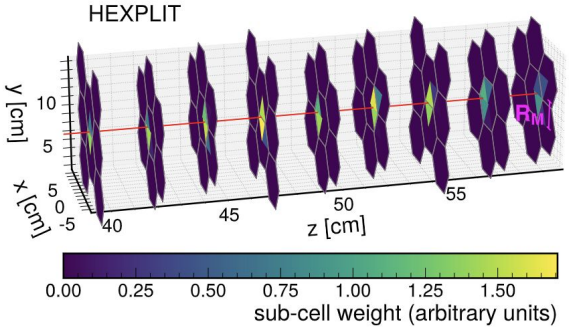
More details in
Sebouh's talk today





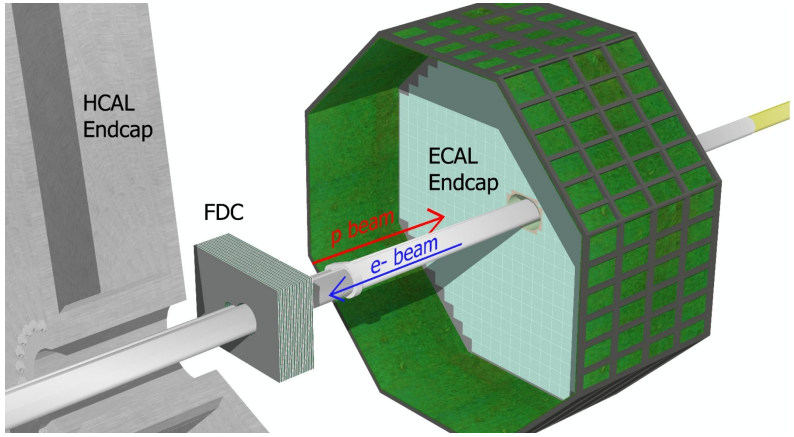


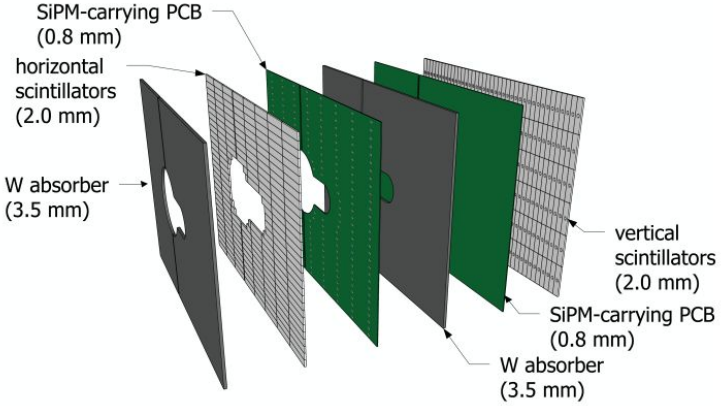


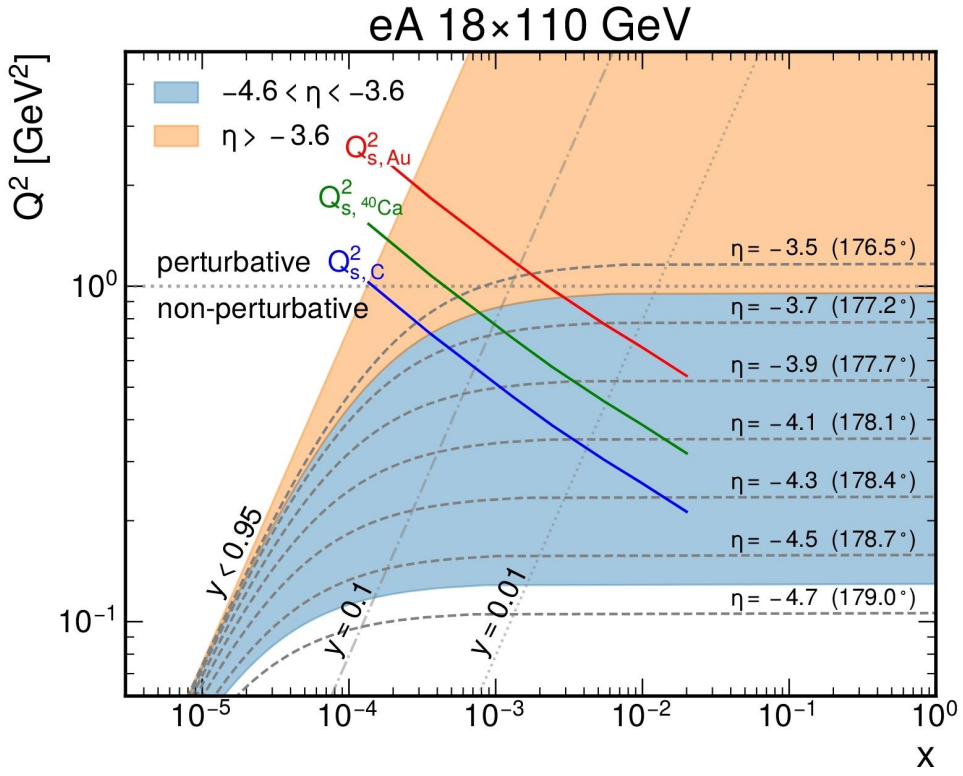


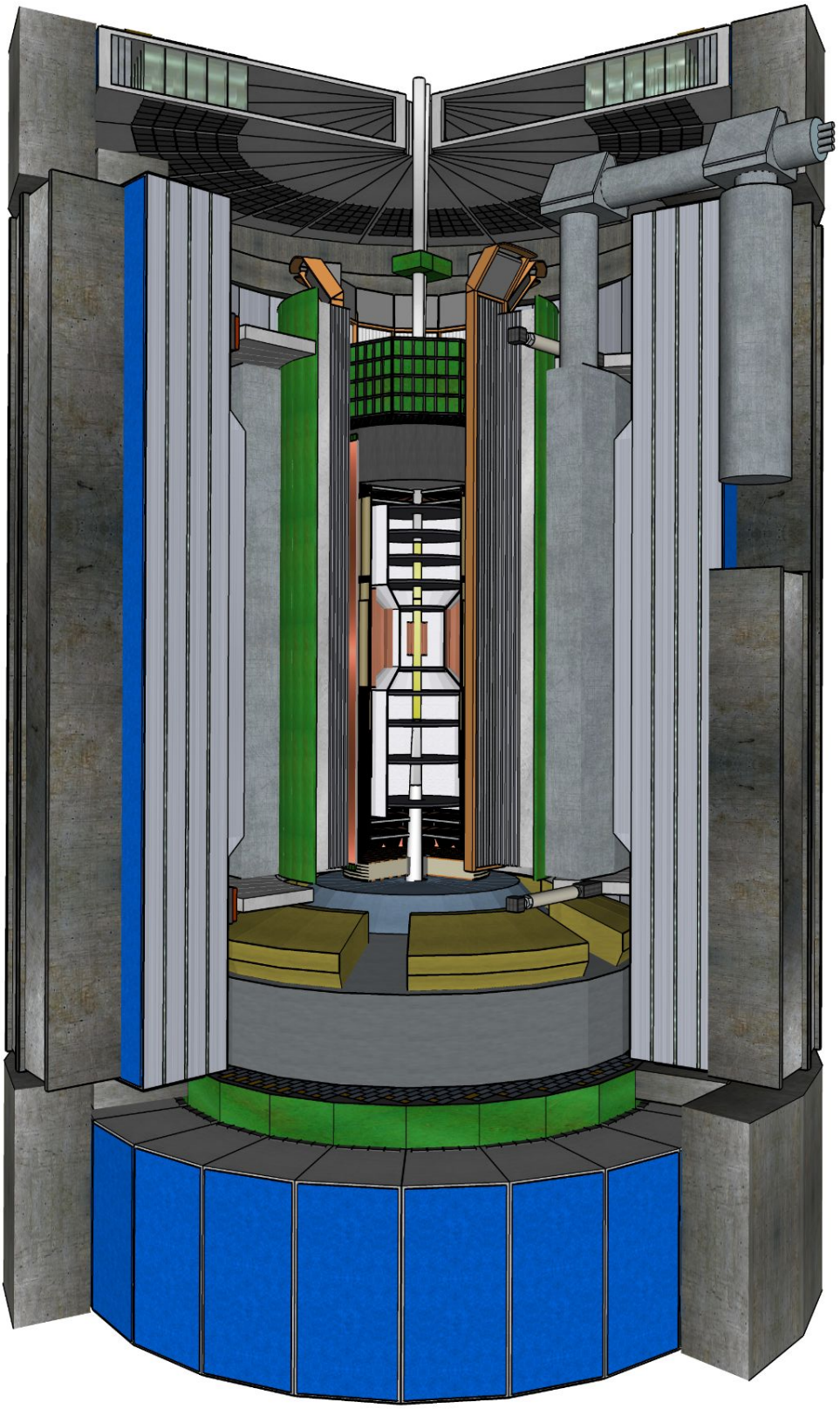
A Few Degree Calorimeter

arXiv:2307.12531



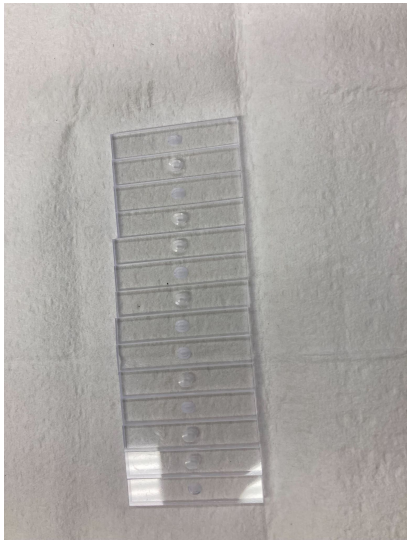
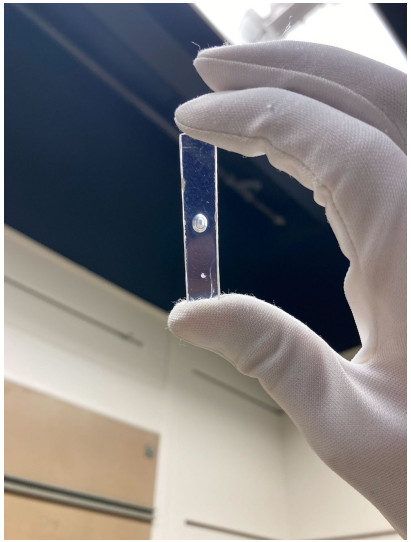
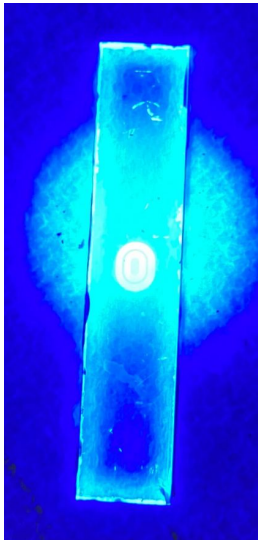


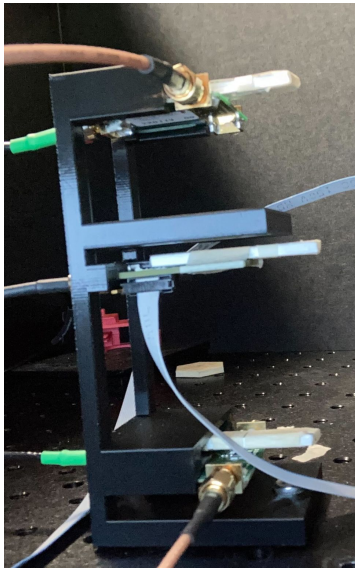




FDC R&D

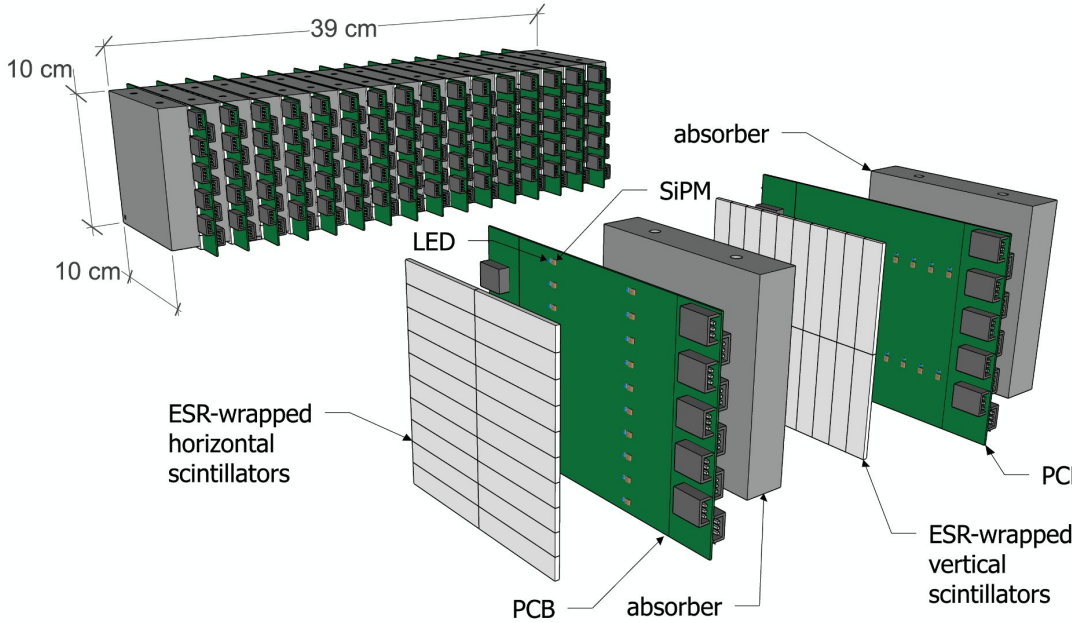
We have made initial steps towards R&D for FDC (detailed in Youseff's talk today)



R&D Plans for FDC (submitted to EIC generic R&D)

- Characterization of building blocks
- Development of timing layer
- Development of 5D algorithms to tag background
- Build prototype & test at JLab



Forward ECAL

We plan to contribute to forward ECAL project

- In near term with SiPM board calibration.
(we just finished setting contract with BNL for eRD106)

- Then mounting a W/SciFi block QA site, possible more?
(depending on circumstances)

Fission @ EIC

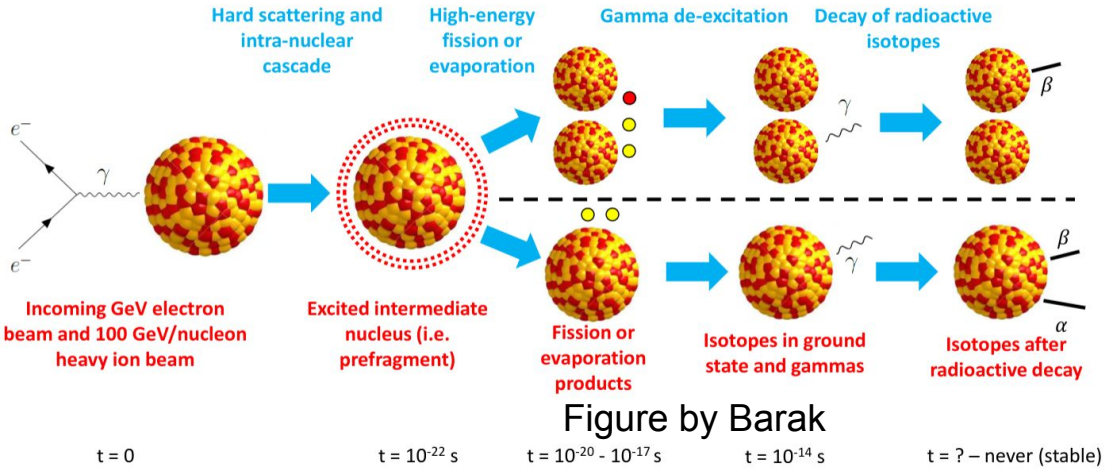
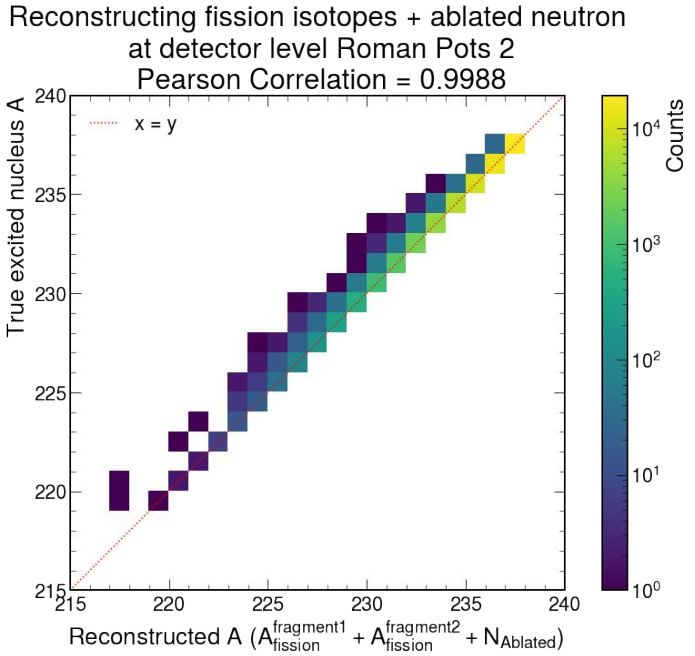


Figure by Barak



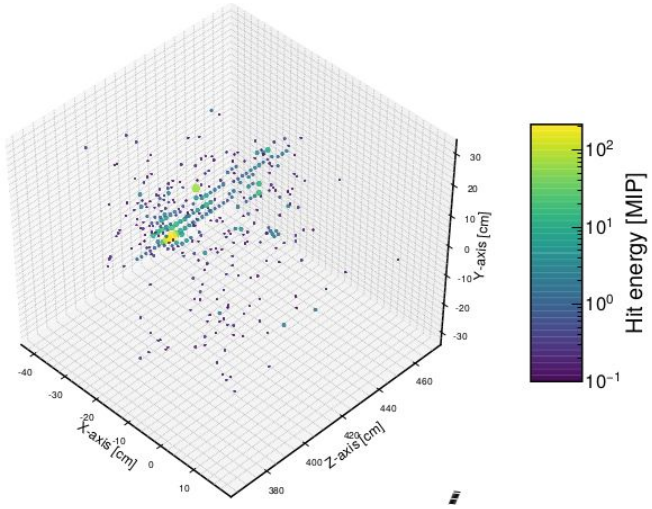
We plan in working developing Barak's idea, and pursue fission studies in particular (as detailed in Jiajun's talk today).

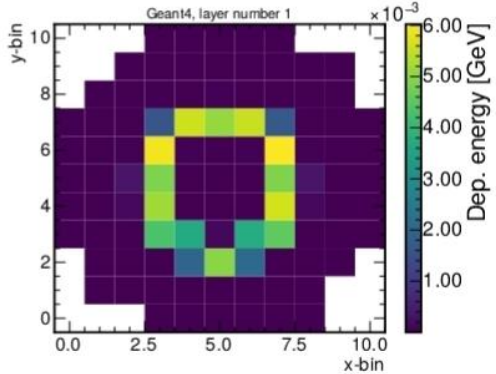
Will be synergistic to ZDC R&D, and new detector to measure fragment's Z ("FZD")

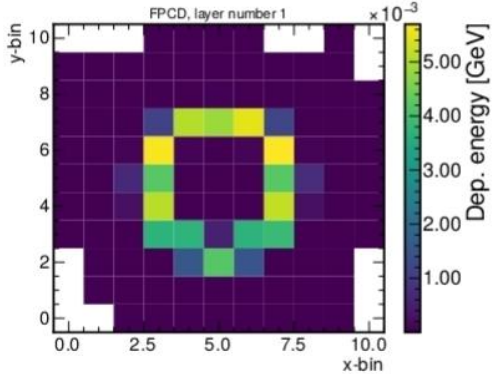
Possible new collaborations within consortium?

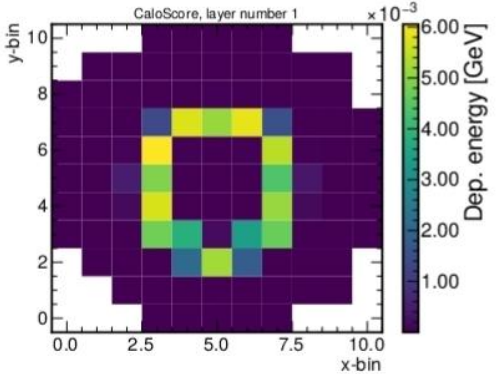
AI (collaboration with LLNL)

We continue to collaborate with LLNL on AI research focused on EIC applications. Optimization of calorimetry for EIC is our current focus (DOE supported).
Recent paper out 2307.04780









Summary of Update and Plans

- Insert was fully integrated in ePIC (yay!)
- Insert building block test paper → in JINST
- Insert 1st testbeam paper soon to be in arXiv
- Setup for SiPM irradiation campaign is ready
- New idea for ZDC → algorithm paper in arXiv
- New idea for FDC → design paper in arXiv
- Plans:
  - Continue development of Insert, particularly production
  - Push for ZDC & develop fission ideas
  - Contribute to W/SciFi ECAL project (eRD106 & beyond)
  - Seek to continue AI/ML collaboration with LLNL (Aaron et al)