Update & Plans

Miguel Arratia,

California EIC consortium meeting,
29/02/24 @ UCR

UCR EIC team 2023 / 2024

Undergraduate /post bac students;
Miguel Rodriguez, Peter Carney, Mia Macias, Ryan Tsiao, Yousef Abdelkadous, Brice Saunders.

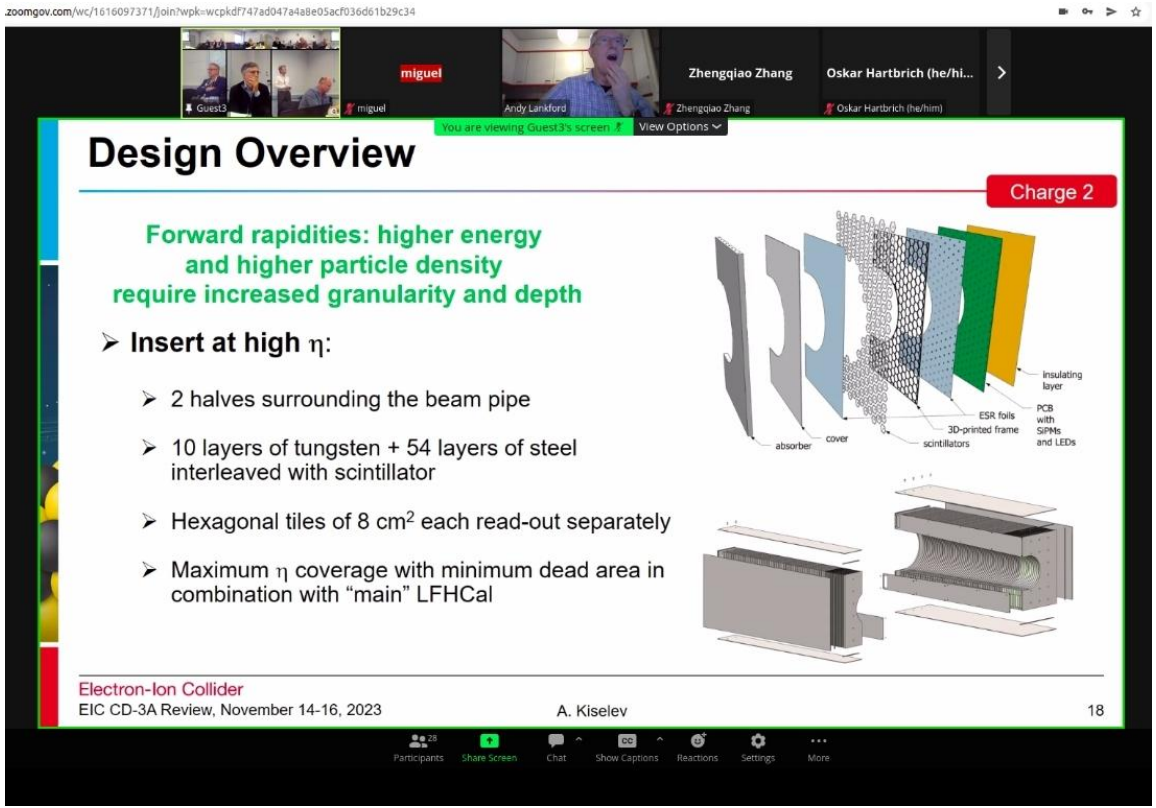
Graduate students:
Ryan Milton, Sean Preins [HEPCAT], Xilin Liang, JiaJun Huang

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

2024 update: Bishnu left (industry), Weibin will take his STAR role

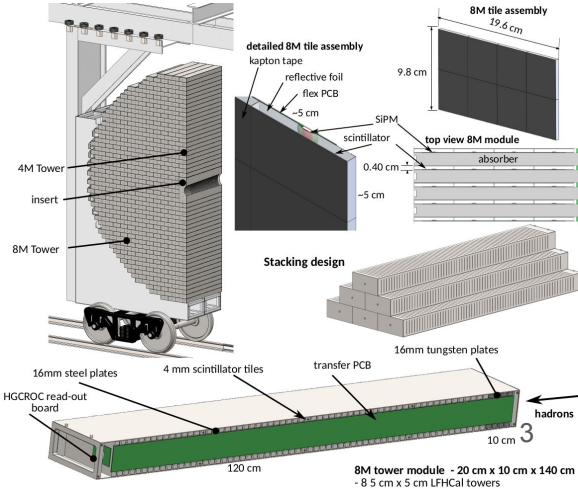
Faculty: Barish, Long, Seto, Arratia

Insert included in ePIC design



Several people involved since 2021: Sean Preins, Ryan Milton, Barak Schmookler, Sebouh Paul, Weibin Zhang, Xilin Liang.

- Insert is now in baseline as its own sub detector.
- Our proposal "informed" the design of much larger HCAL endcap, which adopted the same technology and our original readout strategy (long PCBs to rear where ASICs are located).



Open Access Article

Beam Test of the First Prototype of SiPM-on-Tile Calorimeter Insert for the EIC Using 4 GeV Positrons at Jefferson Laboratory

by Miguel Arratia [1,2,*], Bruce Bagby [1], Peter Carney [1], Jiajun Huang [1], Ryan Milton [1], Sebouh J. Paul [1], Sean Preins [1], Miguel Rodriguez [1] and Weibin Zhang [1]

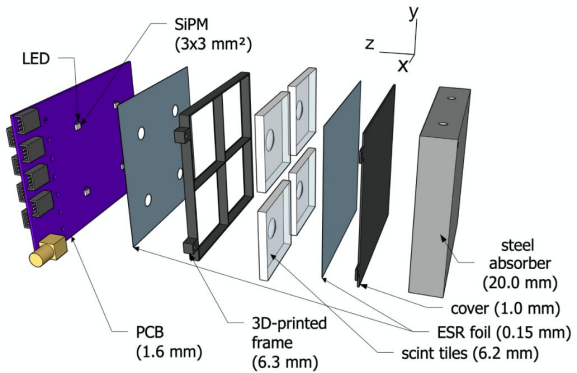
[1] Department of Physics and Astronomy, University of California, Riverside, CA 92521, USA

[2] Thomas Jefferson National Accelerator Facility, Newport News, VA 23606, USA

* Author to whom correspondence should be addressed.

Instruments **2023**, *7*(4), 43; **https://doi.org/10.3390/instruments7040043**

Submission received: 2 September 2023 / Revised: 11 November 2023 / Accepted: 13 November 2023 / Published: 17 November 2023



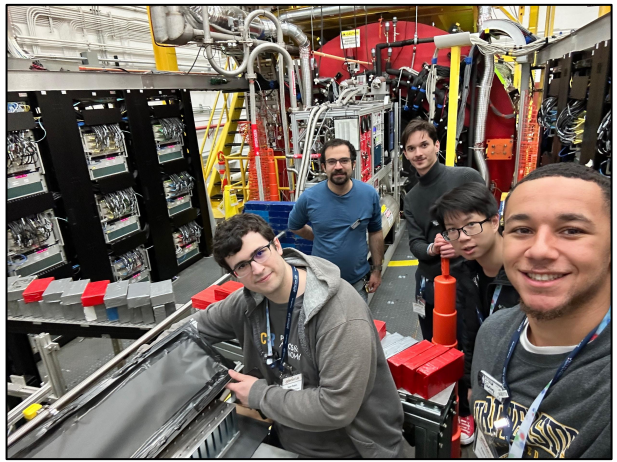
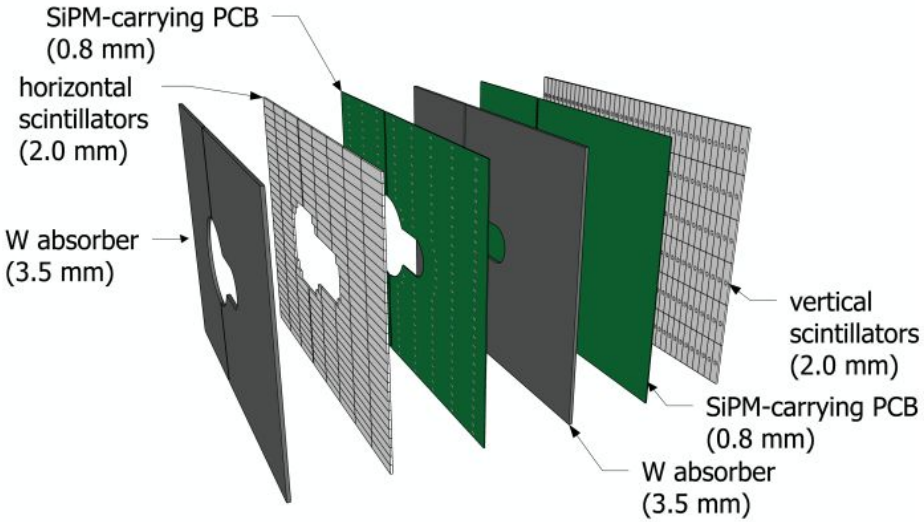
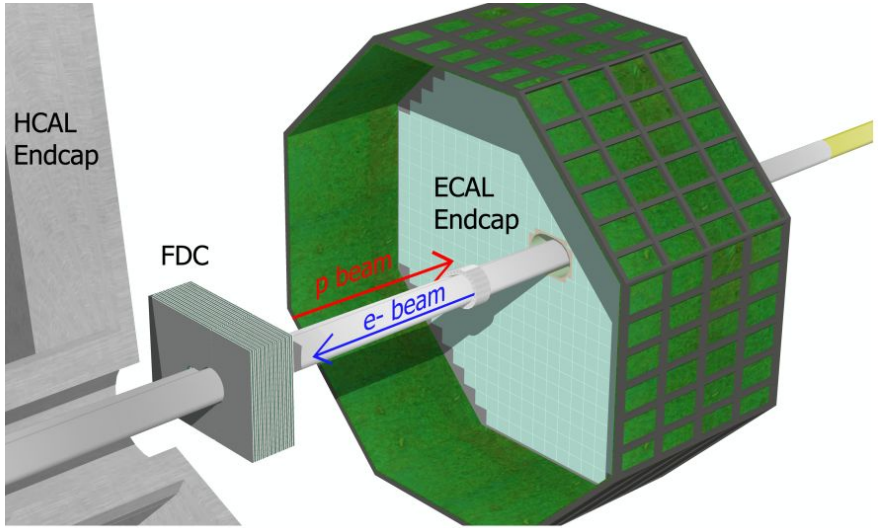


Figure 1. (**Left**): exploded view of prototype layer design. (**Right**): calorimeter insert prototype.

FDC proposal funded by EIC generic R&D

Barak, Weibin, Sebouh, Ryan Milton involved.

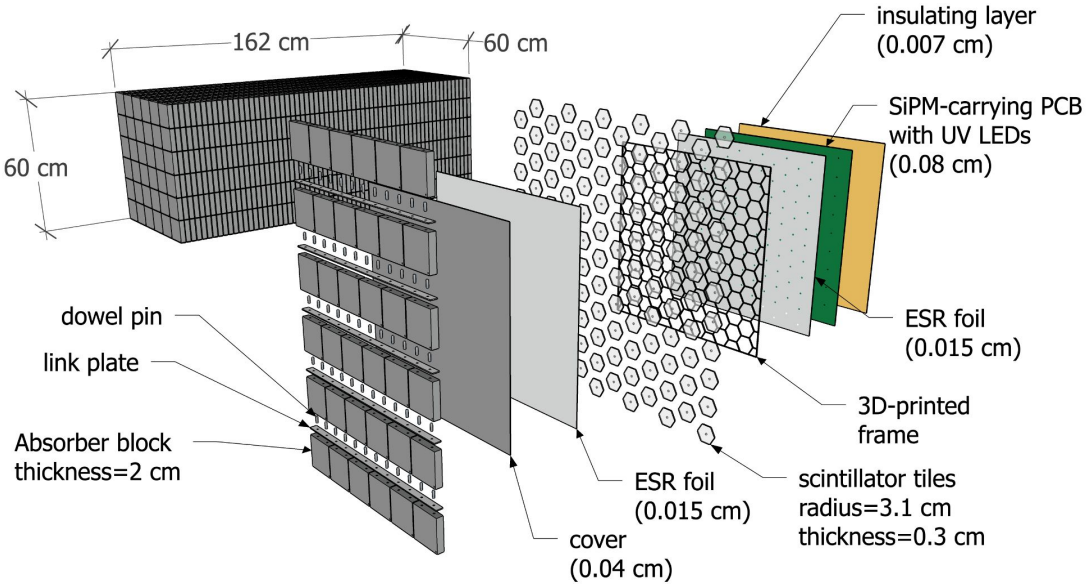


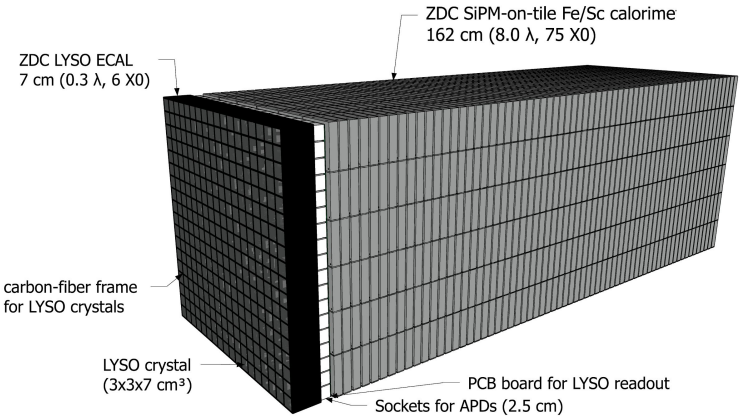


https://arxiv.org/abs/2307.12531

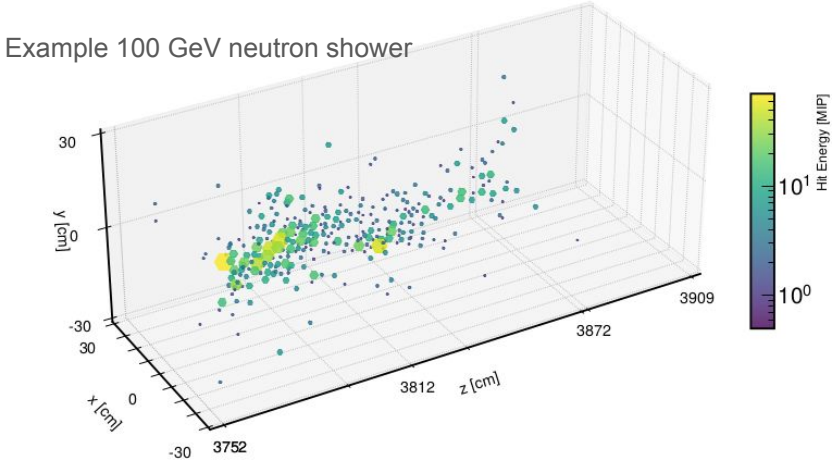
New ZDC design proposed & accepted!

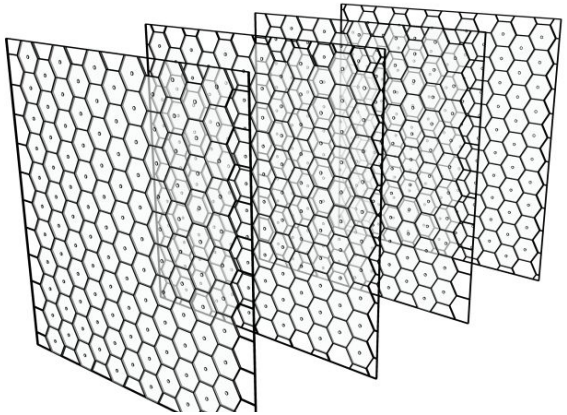
Sebouh, Ryan, Barak involved. **Paper in preparation.**

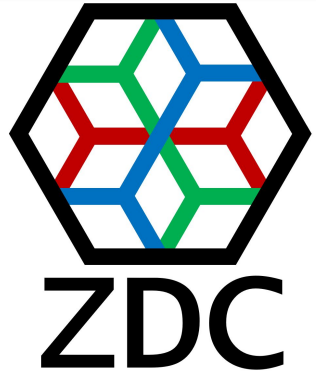


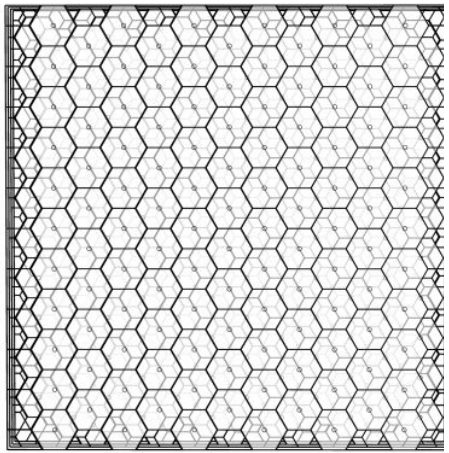


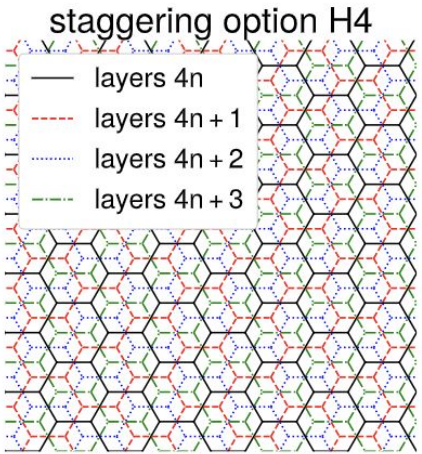
ZDC novel design and novel algorithm (HEXPLIT)











Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment
Volume 1060, March 2024, 169044

Full Length Article

Leveraging staggered tessellation for enhanced spatial resolution in high-granularity calorimeters

Sebouh J. Paul [a], Miguel Arratia [a b]

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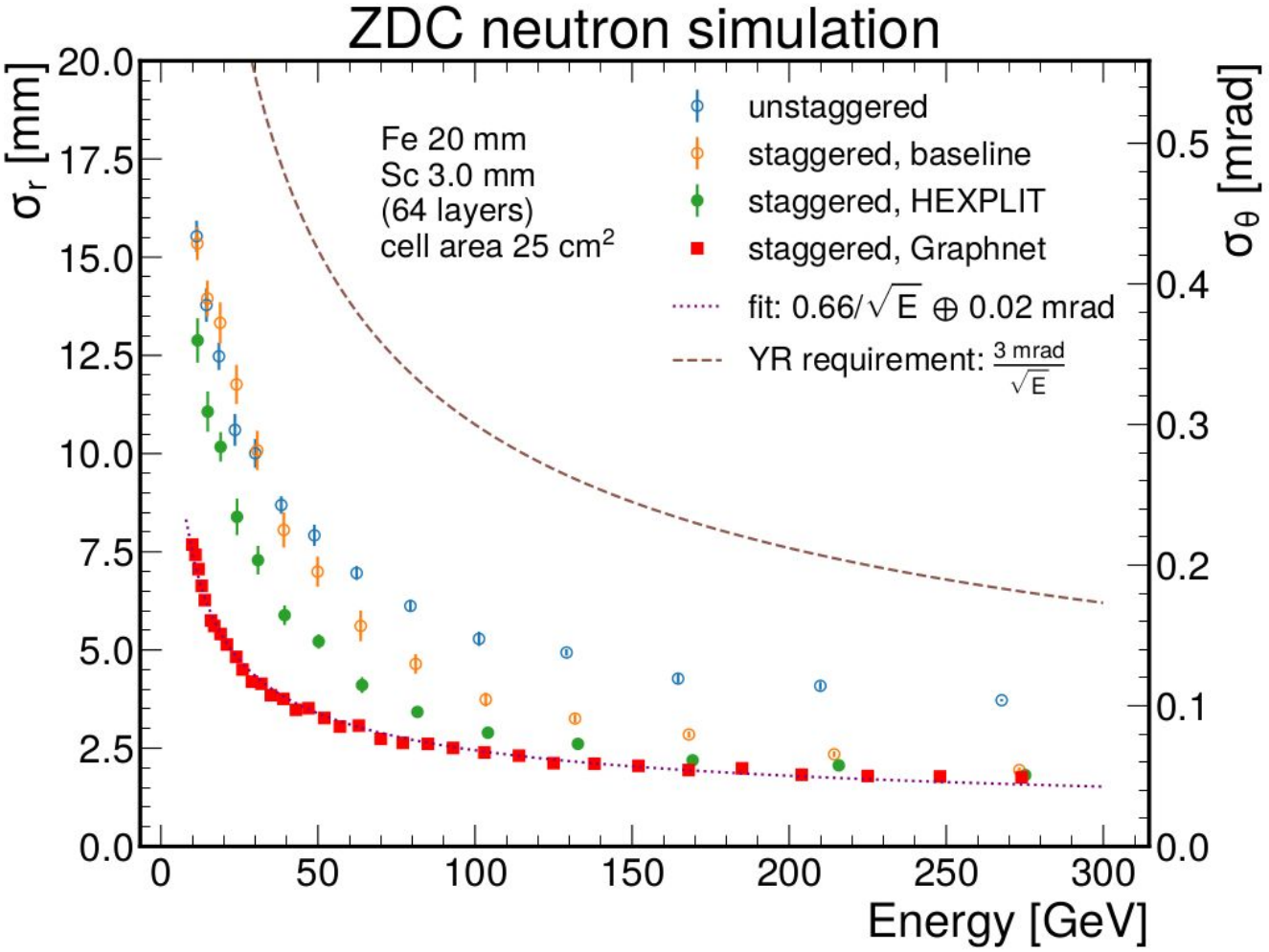
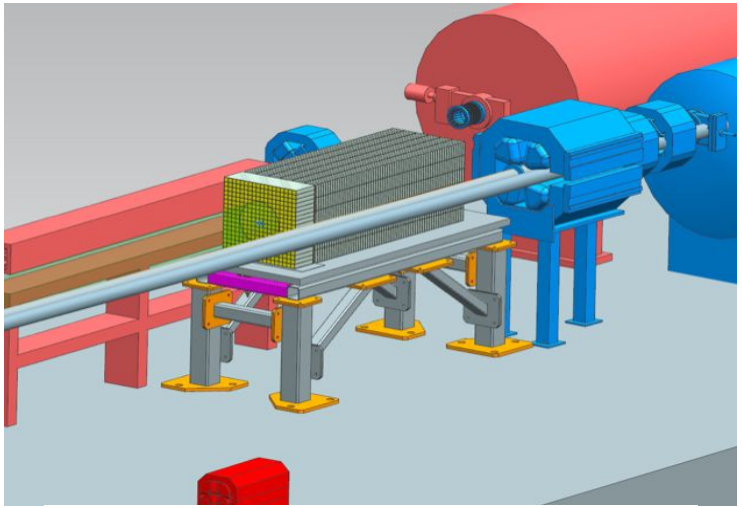
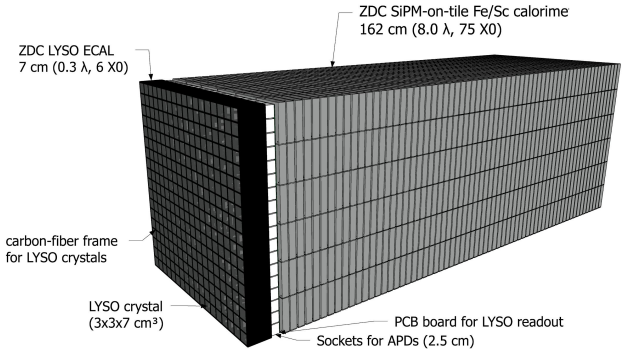
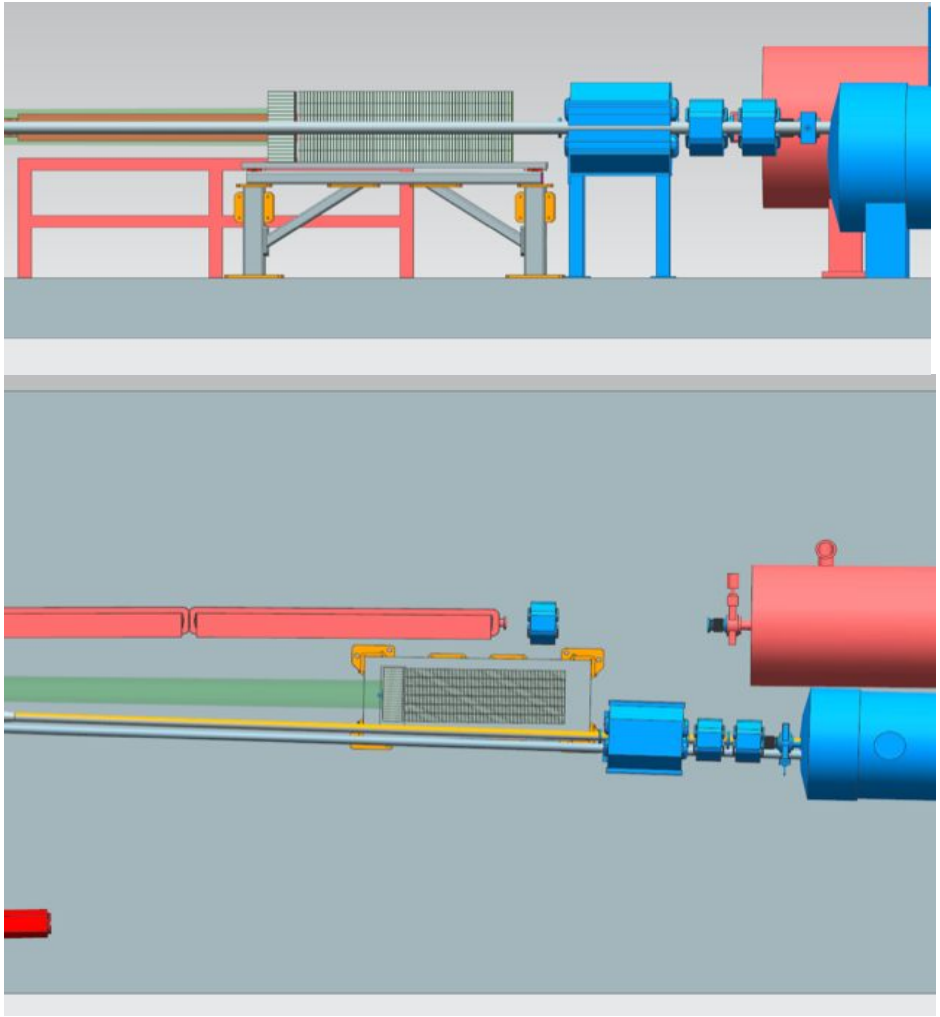
https://doi.org/10.1016/j.nima.2023.169044 Get rights and content


ZDC neutron simulation
Fe 20 mm
Sc 3.0 mm
(64 layers)
cell area 25 cm^2
unstaggered
staggered, baseline
staggered, HEXPLIT
staggered, Graphnet
fit: $0.66/\sqrt{E} \oplus 0.02$ mrad
YR requirement: $\frac{3\ \text{mrad}}{\sqrt{E}}$
σ_r [mm]
σ_θ [mrad]
Energy [GeV]
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
0
50
100
150
200
250
300
0.1
0.2
0.3
0.4
0.5

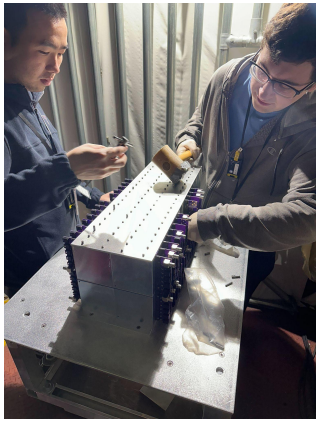
Our ZDC is in EIC project CAD, Passed “preliminary design review”

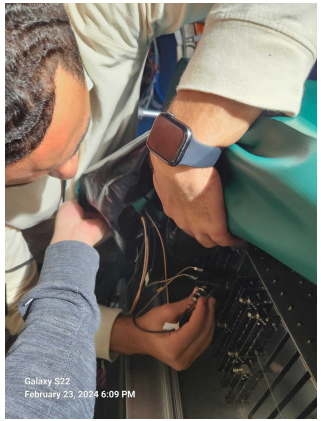


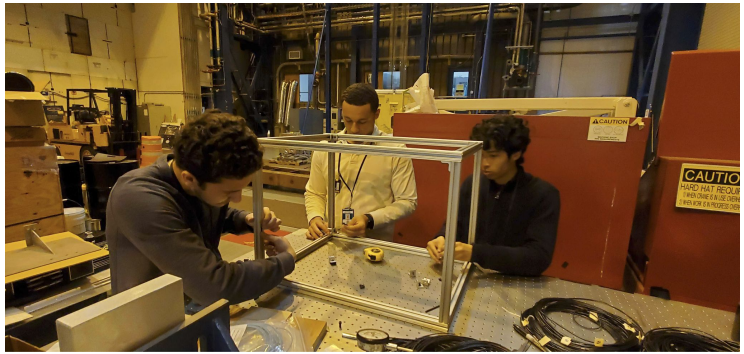




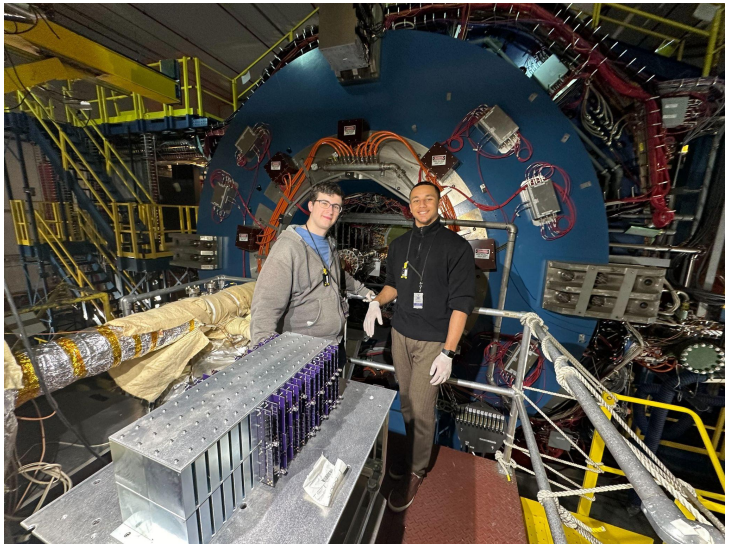
Trip to RHIC to install prototype in STAR Hall, last week



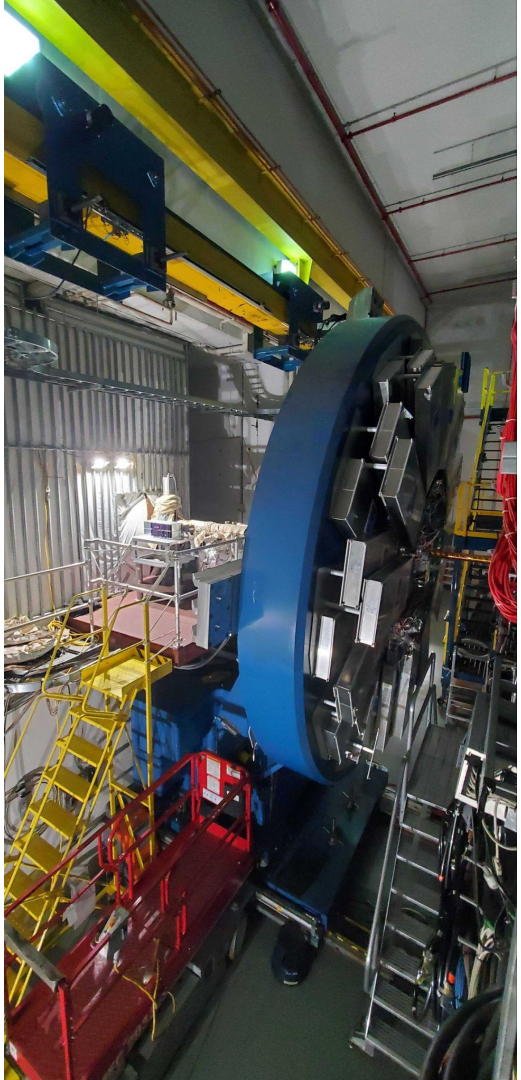


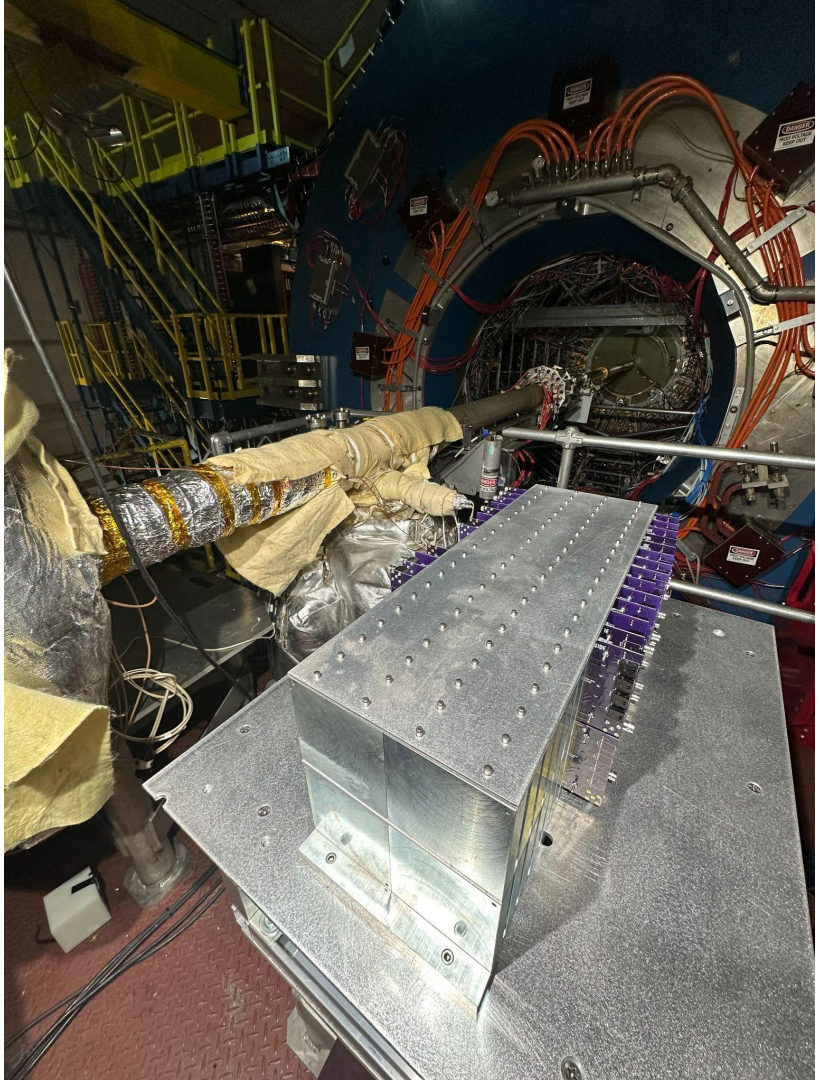


Selfies

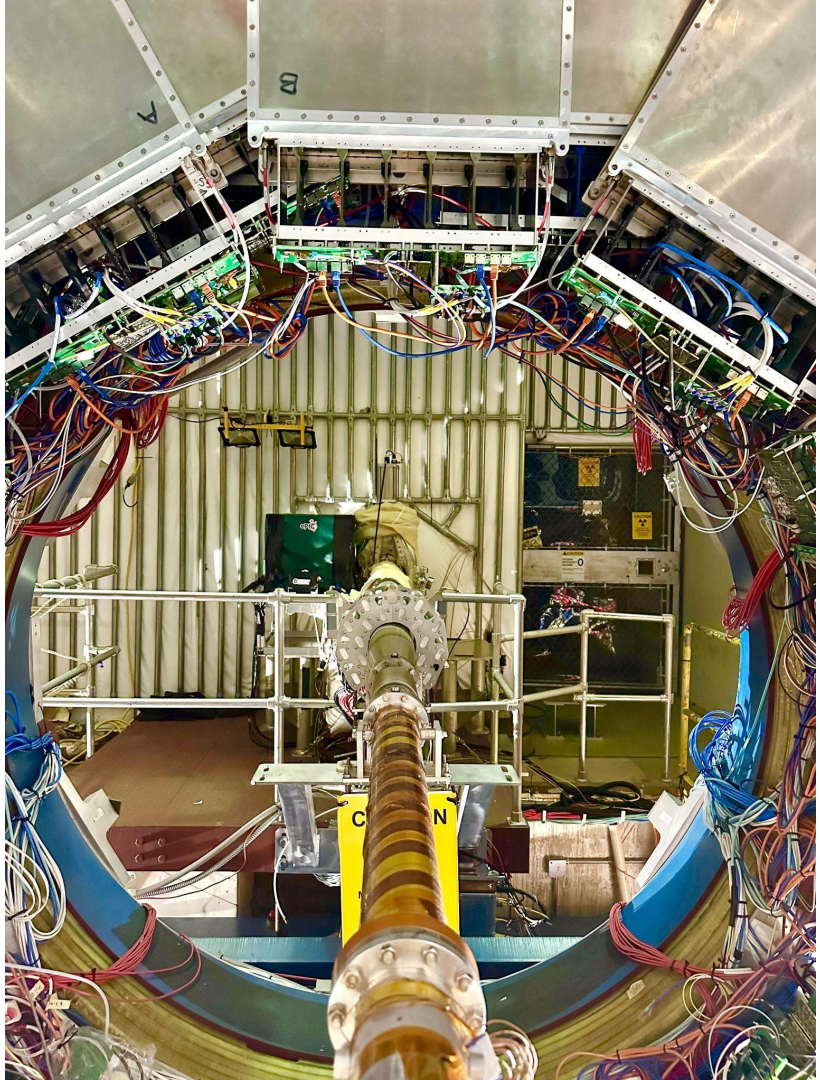


Prototype @STAR

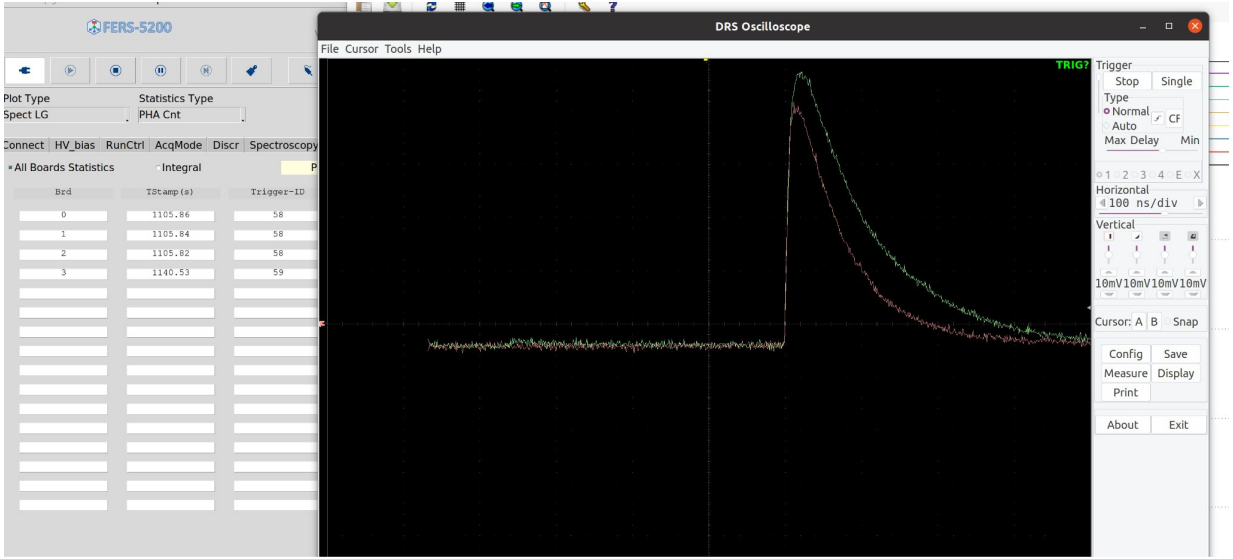




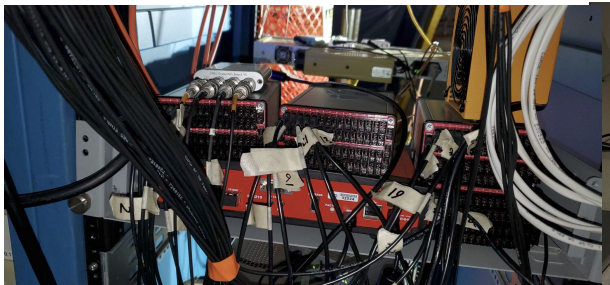
Best pic Award

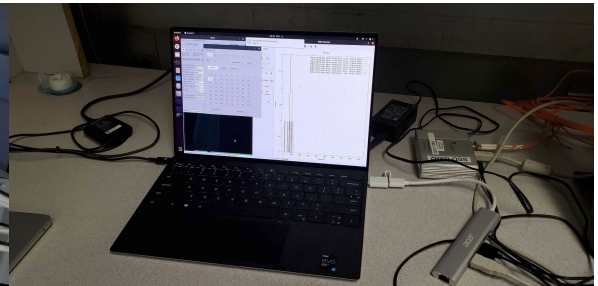


Taking cosmic data *in situ*



Our standalone DAQ & trigger system in racks in STAR Hall





Controlling our setup from STAR Control Room

Thanks Oleg for helping us arrange this!

Released on Christmas day 2023

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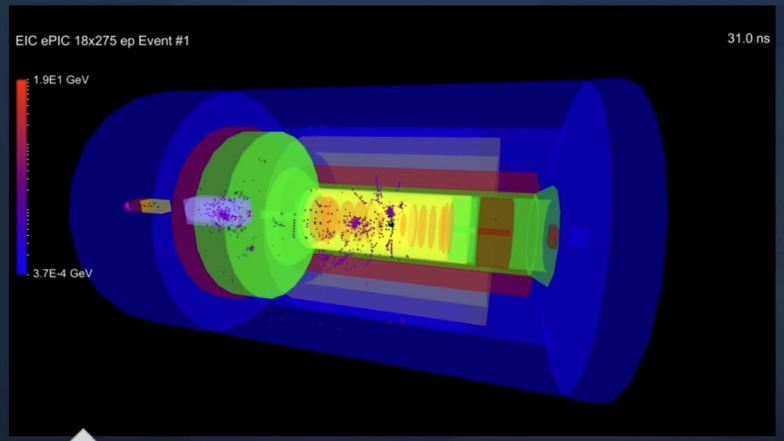
VIRTUE

Community Hub



A customizable event display for collider experiments for desktop or virtual reality. Explore electron-proton collisions in the ePIC detector at the future Electron-Ion Collider, or upload your own detector geometry and collision data to be animated.

ALL REVIEWS: 2 user reviews

RELEASE DATE: Dec 25, 2023

DEVELOPER: Sean Preins
PUBLISHER: Arratia Lab

Popular user-defined tags for this product:

Simulation | Education | Animation & Modeling | 3D | +

Developed by Sean

DOE Office of Science
@doescience

Follow

The real-life Electron Ion Collider is currently in the design stage. But you can get a peek into some of what physicists will learn from it by using the Virtual Interactive Reality Toolkit for Understanding the EIC, developed @UCRiverside: news.ucr.edu/articles/2023/...

12:02 PM · Feb 26, 2024 · **411** Views

EIC | ePIC Collaboration

bnl.gov/eic/epic.php

Electron-Ion Collider

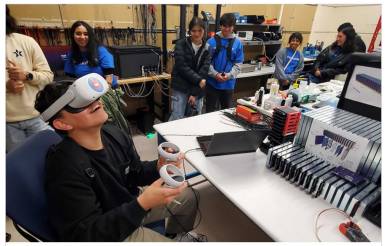
GOALS THE MACHINE

The ePIC Collaboration

Building the world's most sophisticated particle detector for analyzing collisions between electrons and protons or other nuclei

The Electron-Proton/Ion Collider (ePIC) Collaboration was formed to design, build, and opera
Electron-Ion Collider, a one-of-a-kind particle collider at Brookhaven National Laboratory.

Brookhaven National Laboratory



Bringing Virtual Reality to Nuclear and Particle Physics

Driving Innovation and Discovery: DOE's Office of Science 2023 Year in Review

Team Engineers Nanoparticles Using Ion Irradiation to Advance Clean Energy and Fuel Conversion

First U.S.-Built Focusing Magnet for LHC Upgrade Arrives at CERN

Our Mission

We advance fundamental research in nuclear and particle physics to gain a deeper understanding of matter, energy, space, and time; apply photon sciences and nanomaterials research to energy challenges of critical importance to the nation; and perform cross-disciplinary research on computation, sustainable energy, national security, and

Plans for 2024

Slide from last Winter meeting @ UCLA

Next steps for insert prototype testing

2023

Jefferson Lab

Second round of testing in Hall-D, with 128 channel ECAL-size prototype

Exploring possibility in Hall B (tagged hadrons)

2023

BERKELEY LAB

SiPM irradiation testing @88" cyclotron

2023

Fermilab

Together with UCLA's W/SciFi ECAL

2024

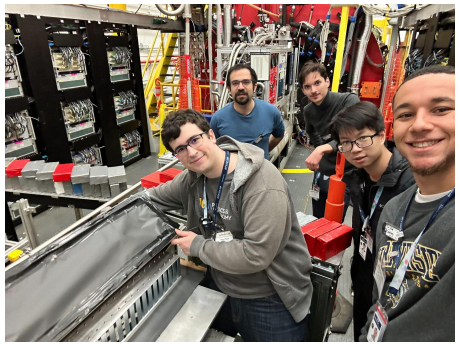
Brookhaven National Laboratory

East-side of STAR near beam pipe.
Operate parasitically during 200 GeV pp run

Next steps for Insert/ZDC prototype testing

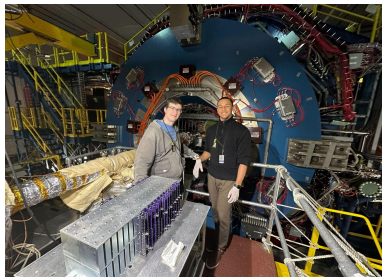
2023

Jefferson Lab



2024

Brookhaven National Laboratory



2024

CROCKER NUCLEAR LABORATORY
CYCLOTRON SERVICES

Funding From EIC Project (Sasha) secured!

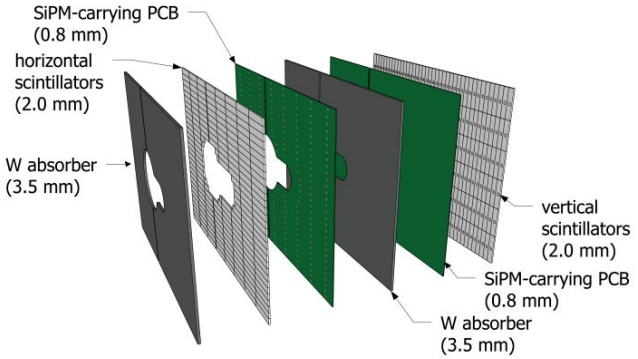
2024

Jefferson Lab

2025?

Fermilab

CALI ZDC



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