

LFHCal & nHCal Workfest

Summary

Friederike Bock
July 27, 2024

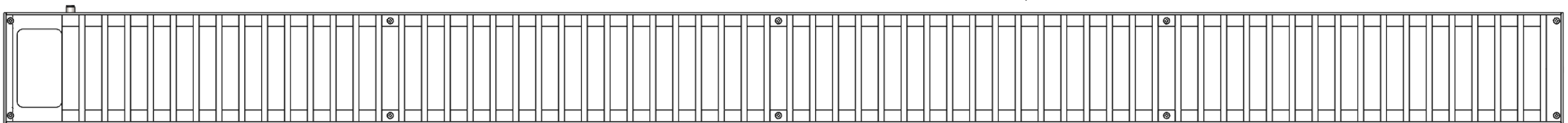
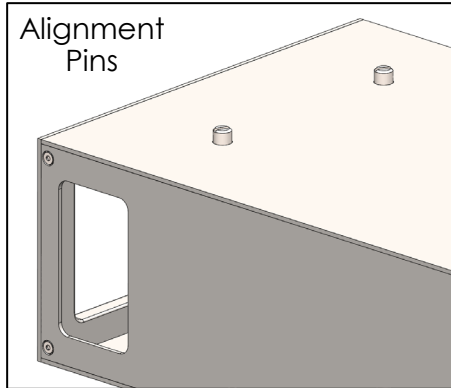
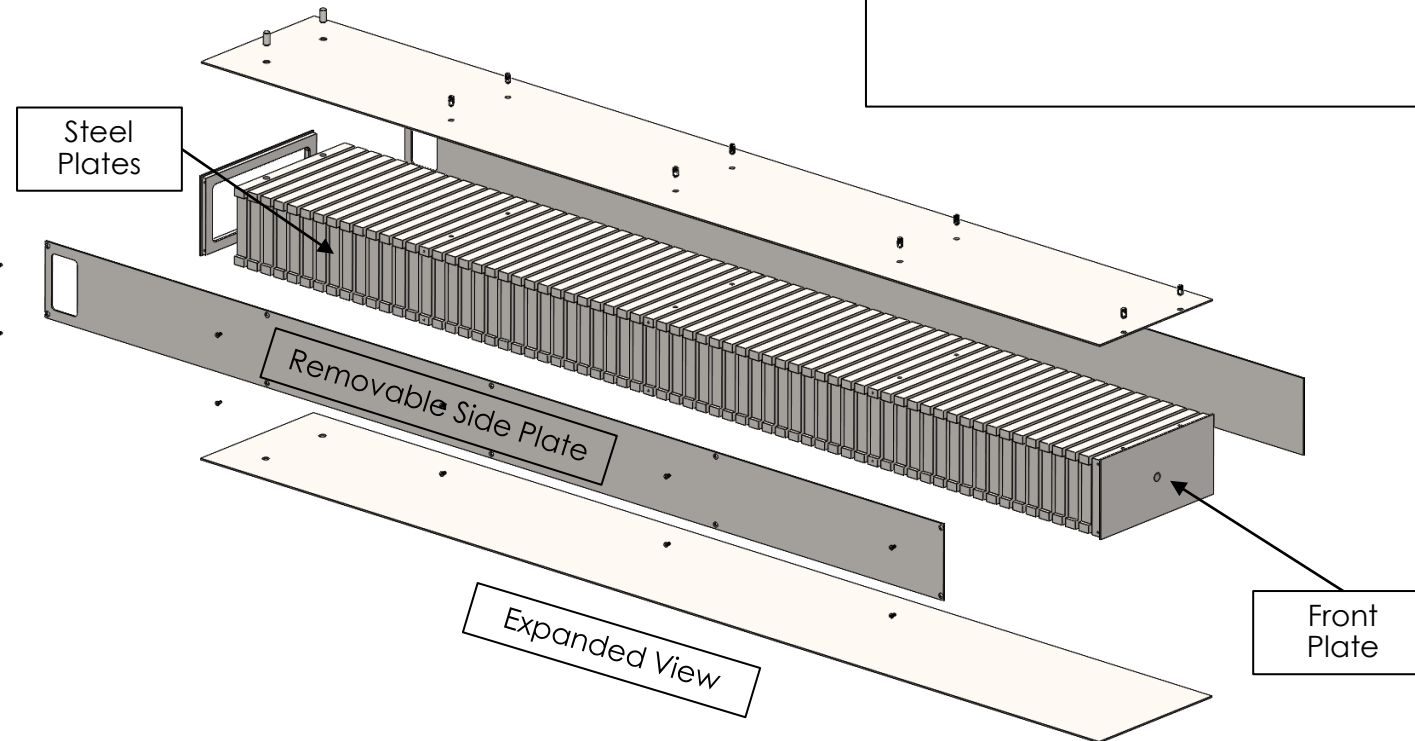
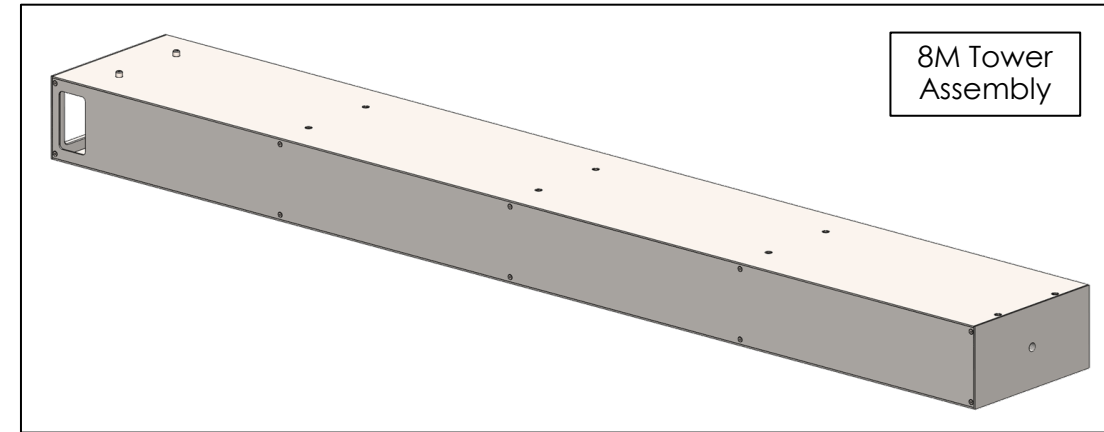
Agenda

- LFHCal mechanics (Friederike)
- LFHCal test beams (Oskar & Fernando)
- Insert test beam (Miguel)
- nHCal Simulations (Leszek)

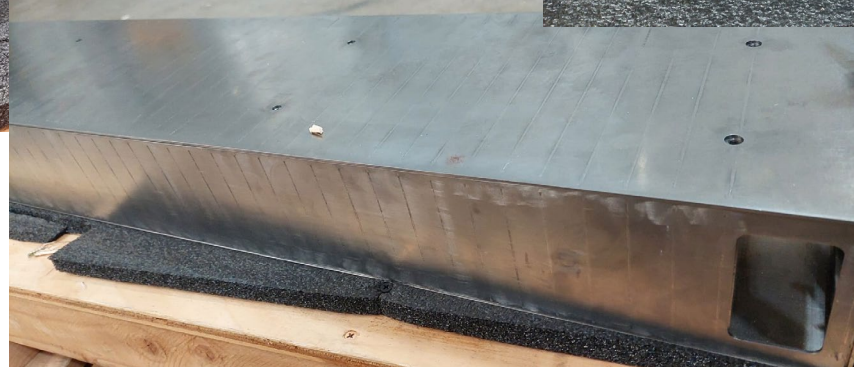
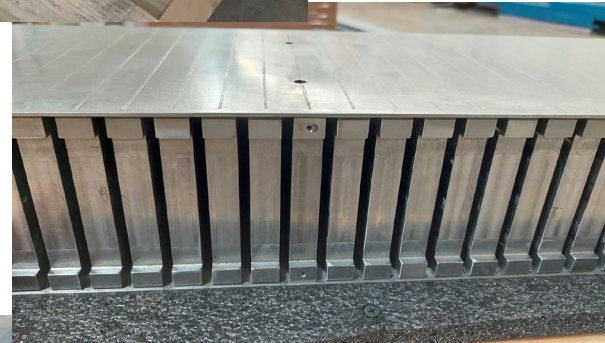
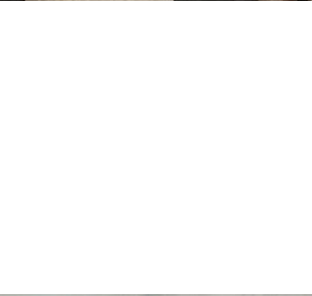
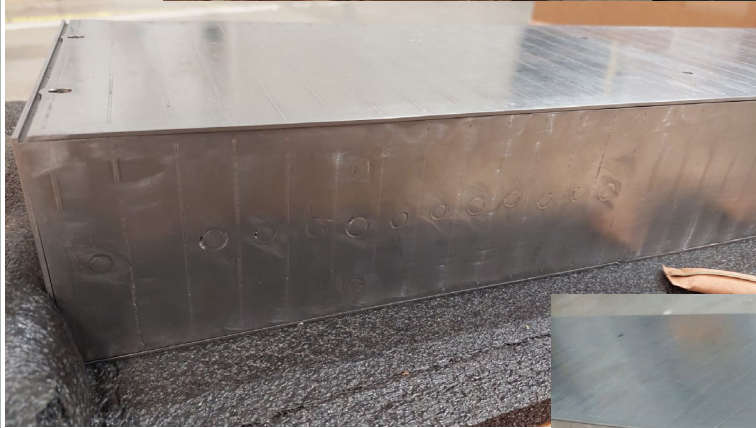
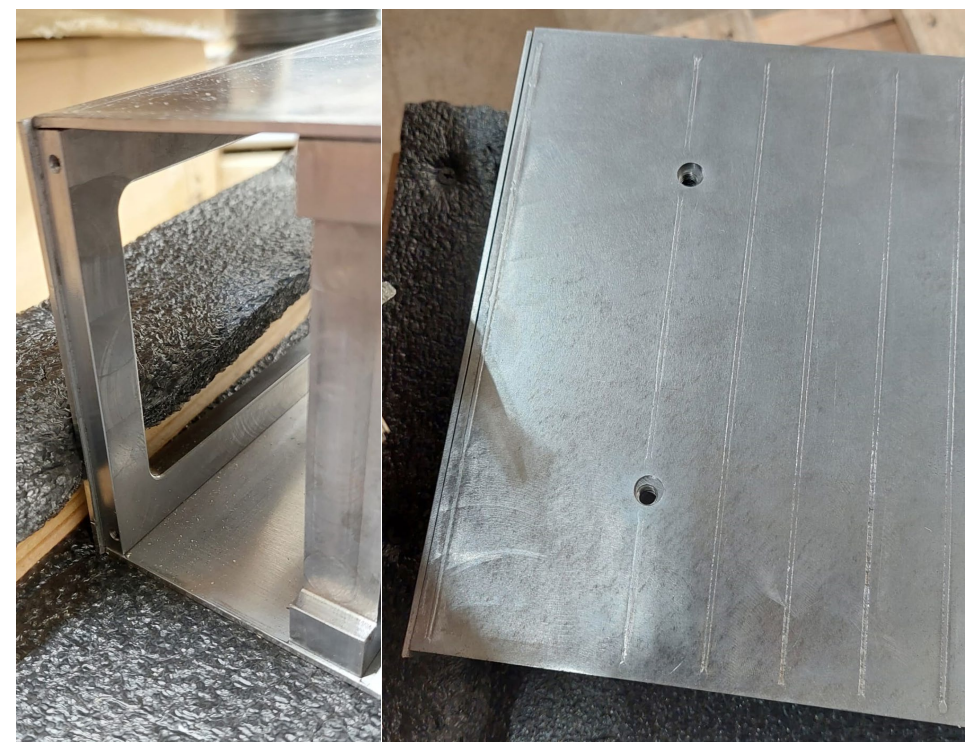
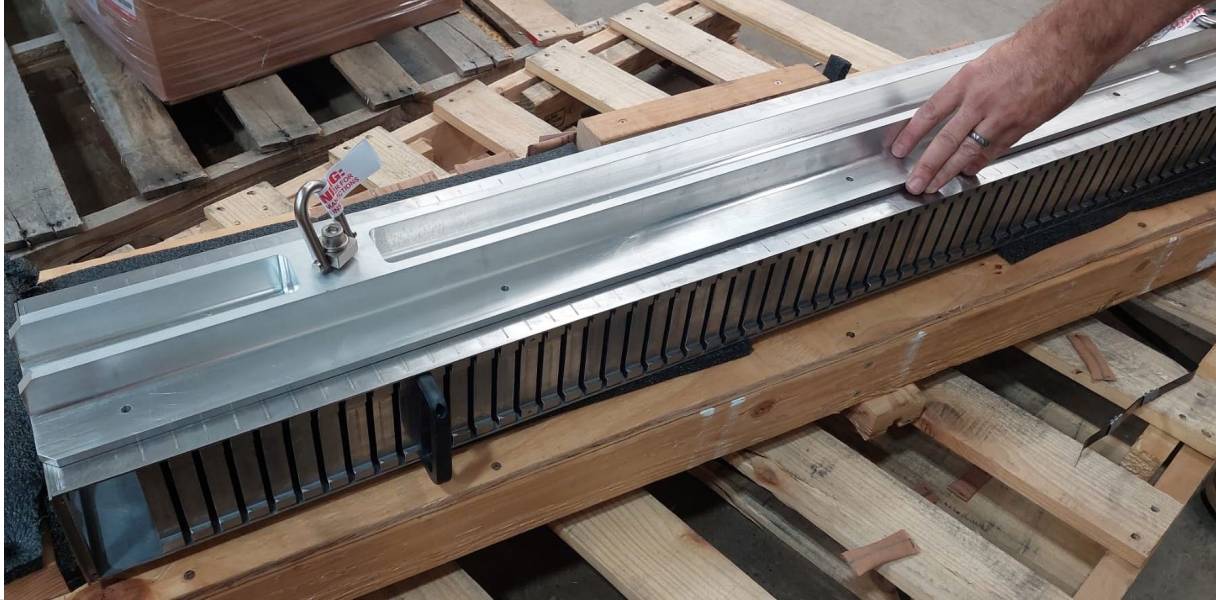
Participants: ~15

Update on mechanics

- Main detector module shape.
- **60x** absorber plate layers, 1020 Carbon Steel.
- Top, bottom, and side panels made from 14 GA sheet metal.

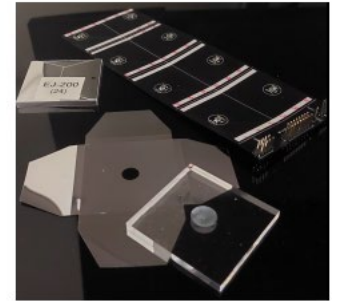
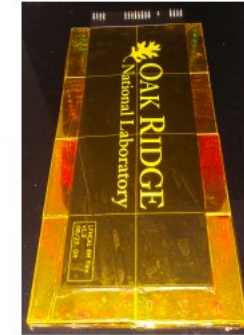


From Theory to Reality

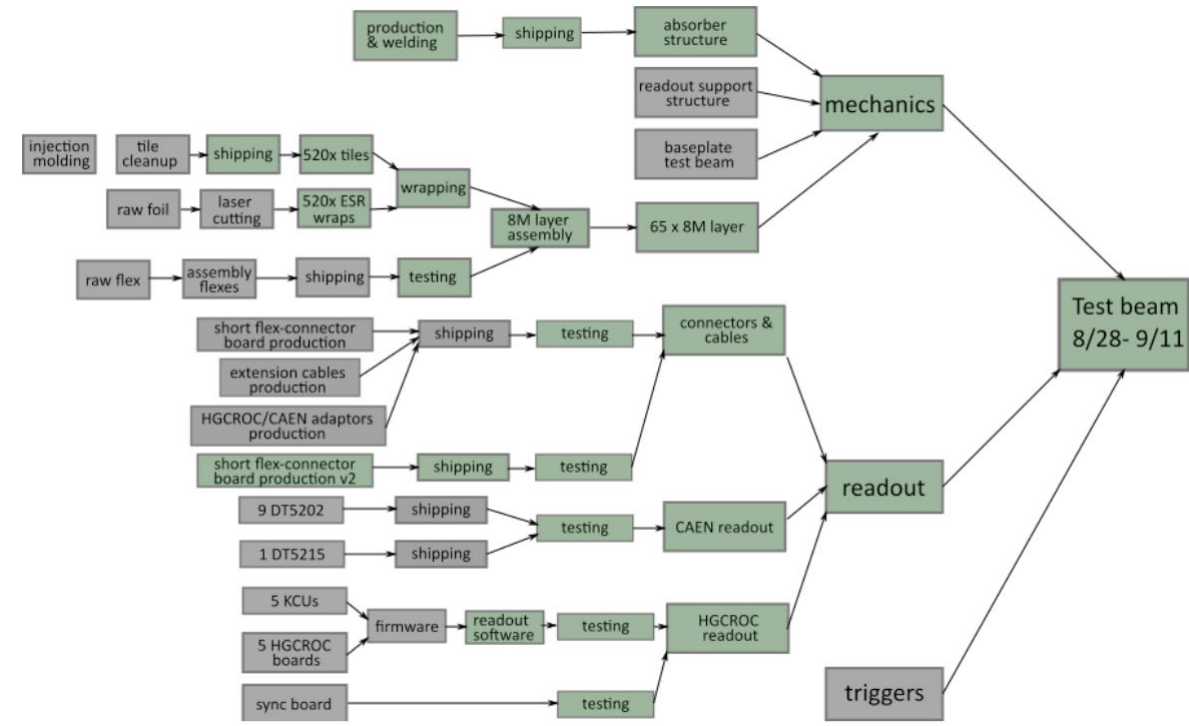


LFHCAL test beams (Oskar & Fernando)

- 2023: mini-LFHCAL @ CERN SPS
 - 10 layers
- 2024: LFHCAL @ CERN PS
 - 65 layers, single full module
 - Single channel CAEN + HGCROC readout
- 2025: LFHCAL @ CERN
 - 8*65 layers, 8 full modules
 - Summed HGCROC readout



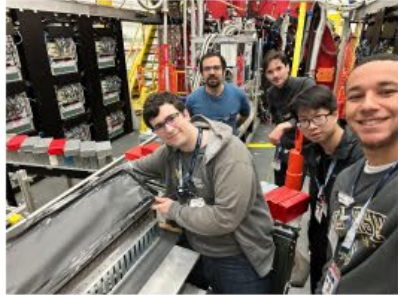
Ready to go! Let's head to CERN!



Insert test beams (Miguel)

2023

Jefferson Lab



Published

2024

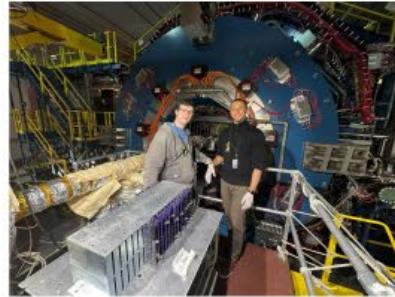
CROCKER NUCLEAR LABORATORY
CYCLOTRON SERVICES



Analysing

2024-2025

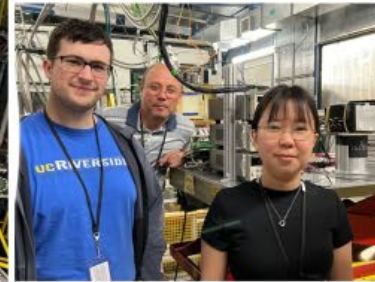
Brookhaven
National Laboratory



Ongoing
+
Analysing

2024

Fermilab



Analysing

2024

Jefferson Lab



Building

2025

Fermilab



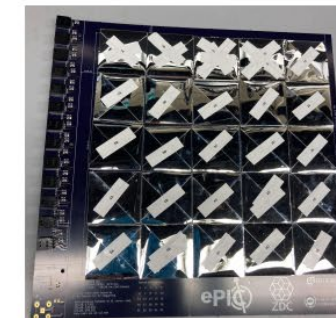
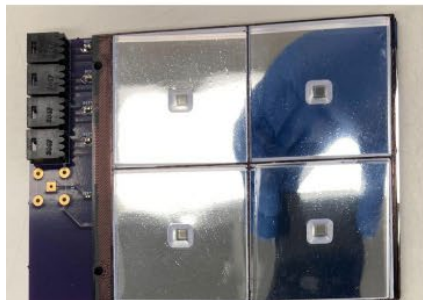
Planning ³

Insert prototypes (Miguel)

Gen-I (Jan 2023)
40 ch. 10x10 cm²

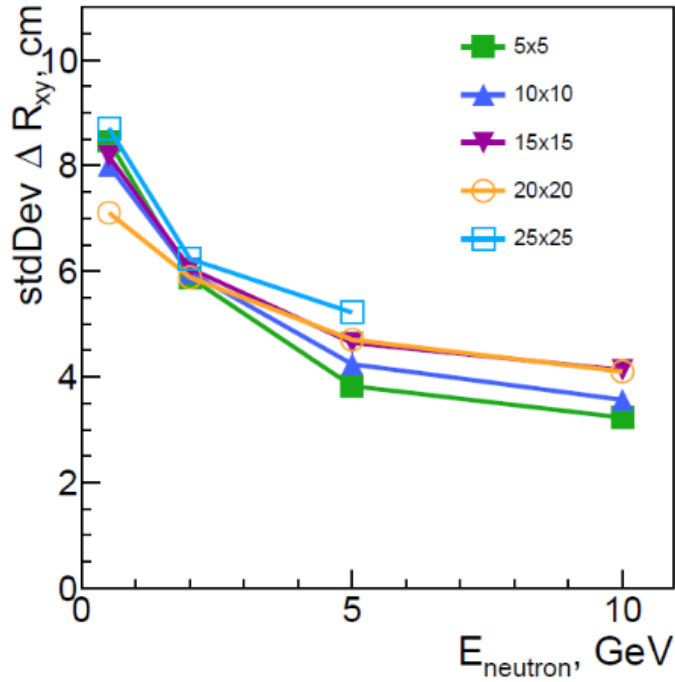
Gen-II (April 2024)
300 ch. 20x20 cm²

Gen-III (Fall 2024)
600 ch. 30x30 cm²



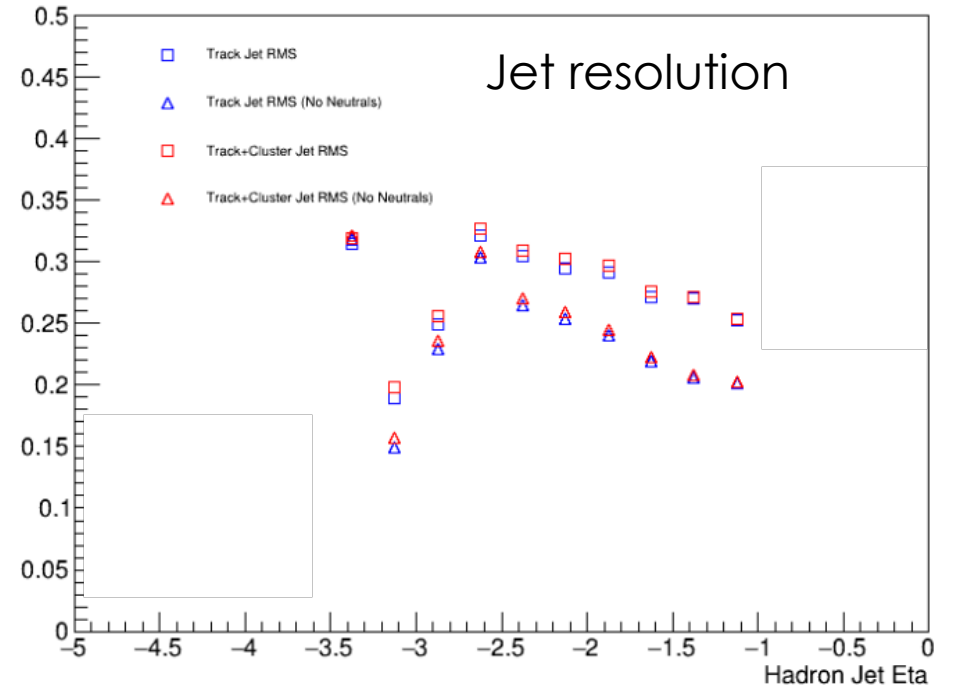
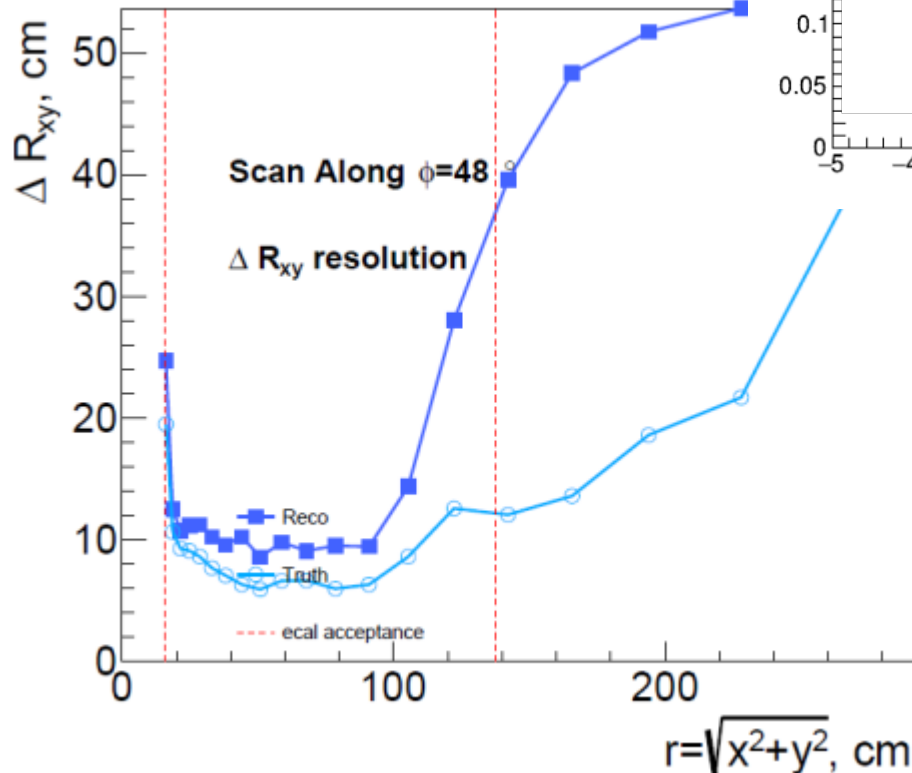
nHCal Simulations (Leszek)

hcal only



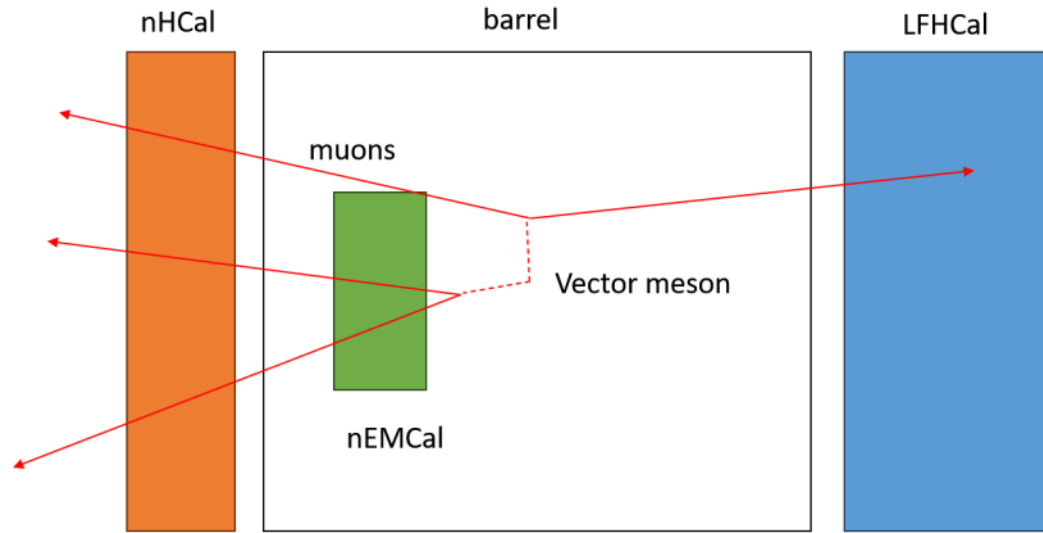
Influence of tile granularity on spatial resolution for neutrons

Spatial resolution vs calo radius

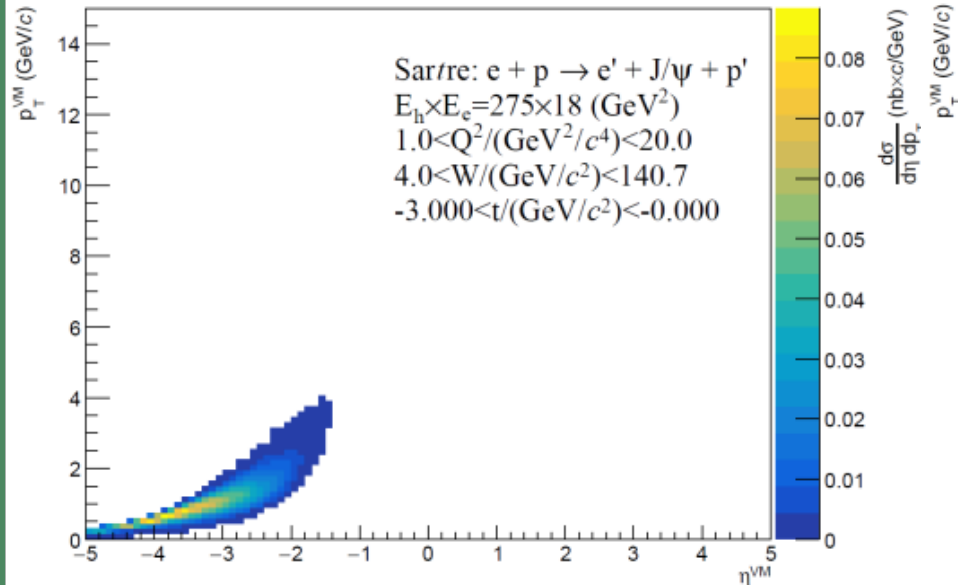


Using nHCal as a veto for jets with a neutral component reconstructed in the nHCal -> improves jet resolution (triangles)

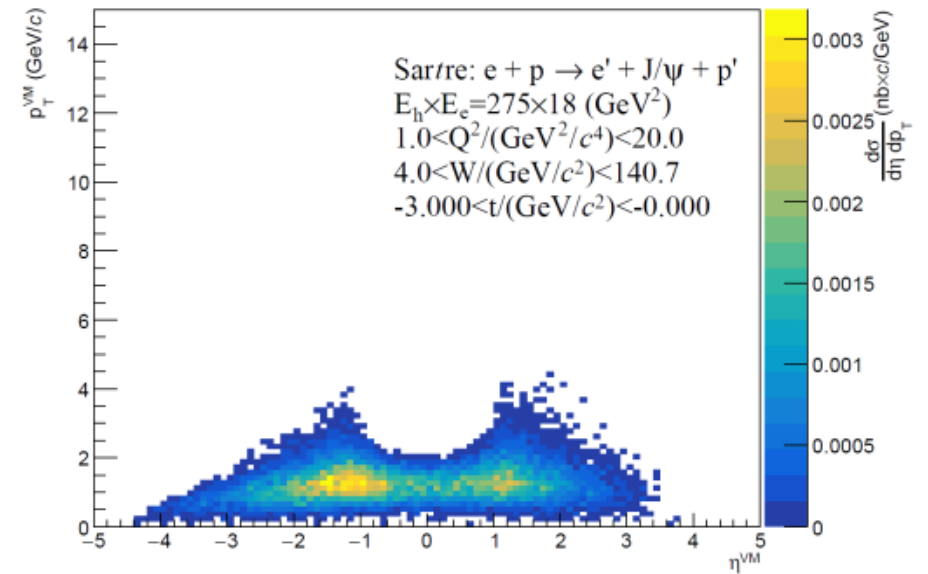
Vector meson $\rightarrow \mu\mu$



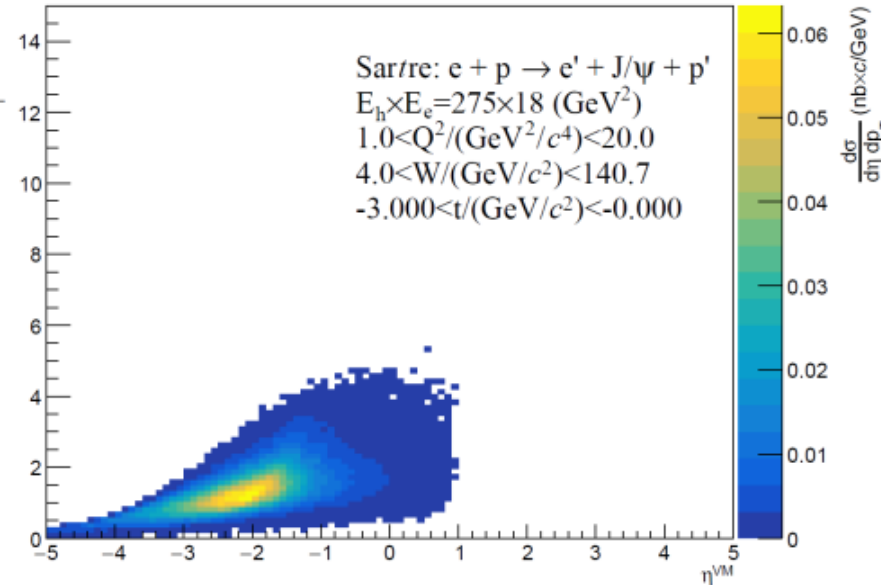
J/ψ vs (p_T , η) with $\mu\mu$ in nHCALxnHCAL



J/ψ vs (p_T , η) with $\mu\mu$ in nHCALxFLHCAL



J/ψ vs (p_T , η) with $\mu\mu$ in nHCALxBar.



UIUC crew investigating the kinematic acceptance for different vector mesons and the possible improvements using the nHCal to tag muons