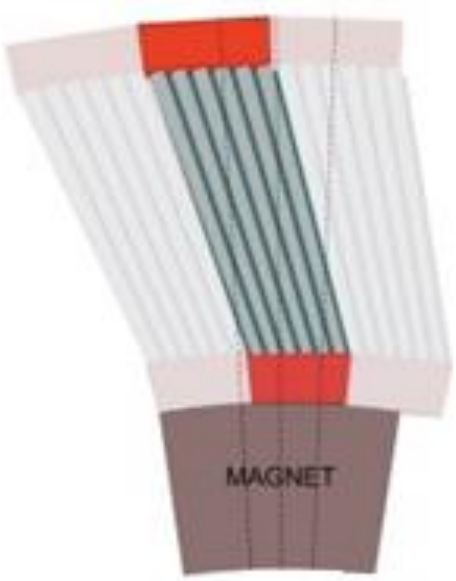
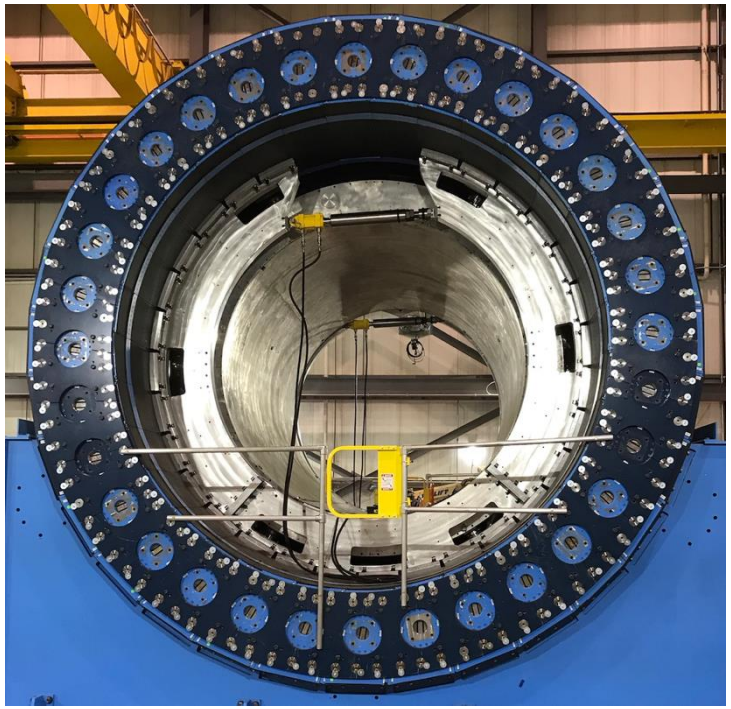
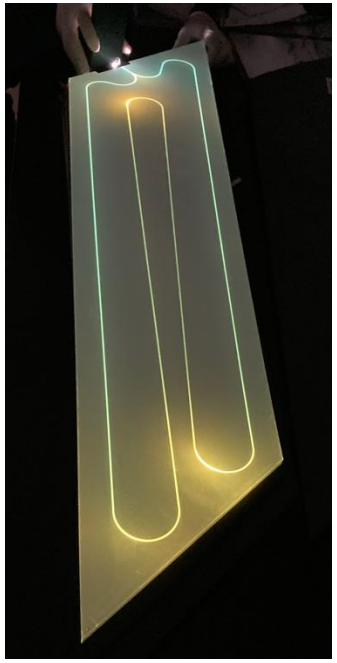
BHCal

Murad Sarsour (GSU) for BHCal

- *HCAL steel and scintillating tiles with wavelength shifting fiber*
- *Outer HCal (outside the solenoid)*
- *Δη x Δφ ≈ 0.1 x 0.1 (sPHENIX towers)*
- *1,536 readout channels - SiPM Readout*







- 32 sectors - 1.8 m inner radius, 2.7 m outer radius
- Titled-tile design: 10 rows of 7mm scint. Tiles (24 tiles per row), 12º tilt angle
- Tapered 1020 steel plates ~26.1 mm - ~42.4 mm
- Completed sector is 6.3 m long, 13.5 tons

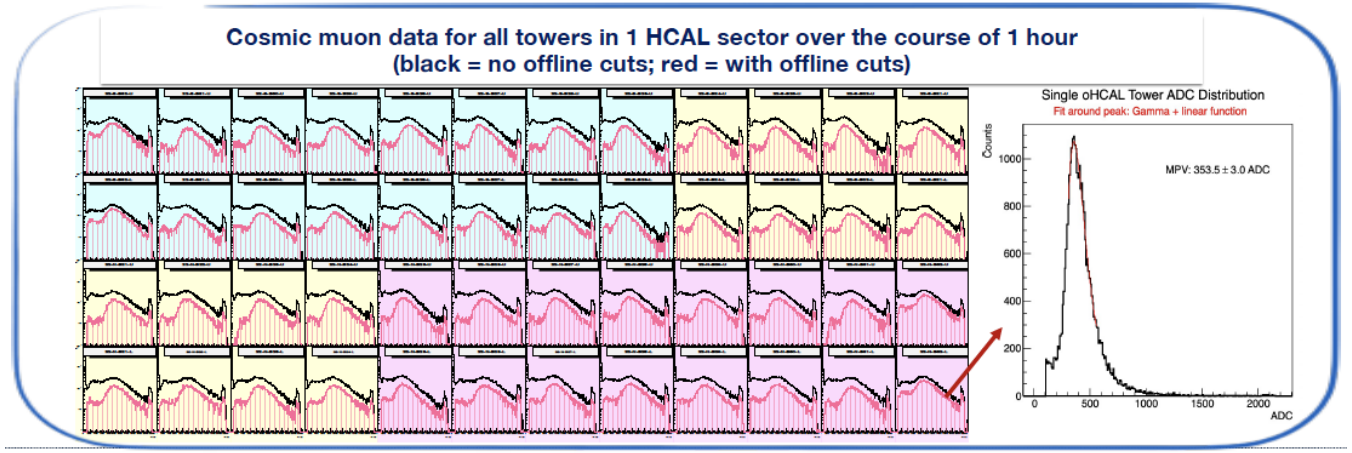
A section of iHCAL sector with tiles and SiPMs

Considerations

- What is the detailed calibration procedure?
- What are the pre-physics operation calibrations?
- How do we make use of cosmics during commissioning/initial quality beam?
- How do we translate the calibration procedure into the running requirements? Do we need dedicated calibration runs?
- What are the readout running requirements for the calibration runs? (running with cosmics and CALOROf that can be sustained rate-wise)
- What are interdependencies?
- How do we incorporate the light-monitoring system into calibrations?

Monitoring & Calibration

- Calorimeter monitoring using LED. LED runs are taking regularly to monitoring the status of HCal.
- MIP calibration with cosmic muon. (Pre-installation preliminary calibration).
  - Equalizes layer response
  - Defines BHCal signal in **MIP units**



❖ Detailed calibration procedure?

❖ Composite hadronic system: Tracker → EMCal → passive magnet yoke → BHCal

Ongoing:

- Jan Vanek (University of New Hampshire) – standard calibration
- David Ruth (New Mexico State University) - ML
- Isolated charged tracks reaching BHCal? ECAL (EM-calibrated) + BHCal response

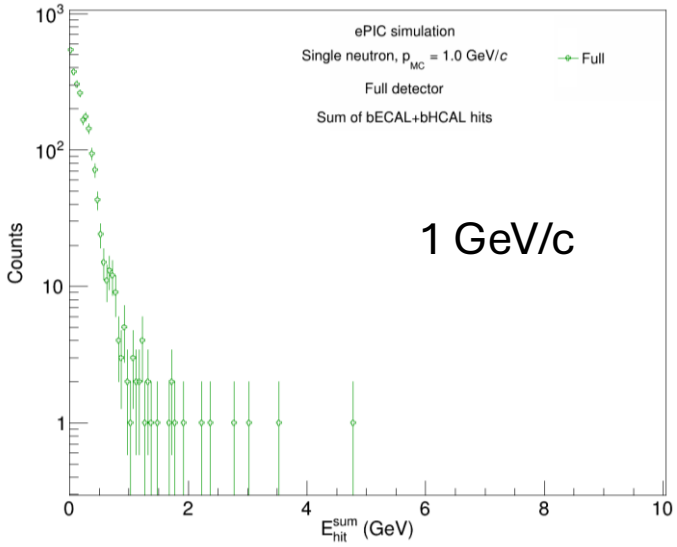
$$E_{ECAL} + c_{BHCal} \cdot E^{MIP}_{BHCal} \approx p_{track}$$

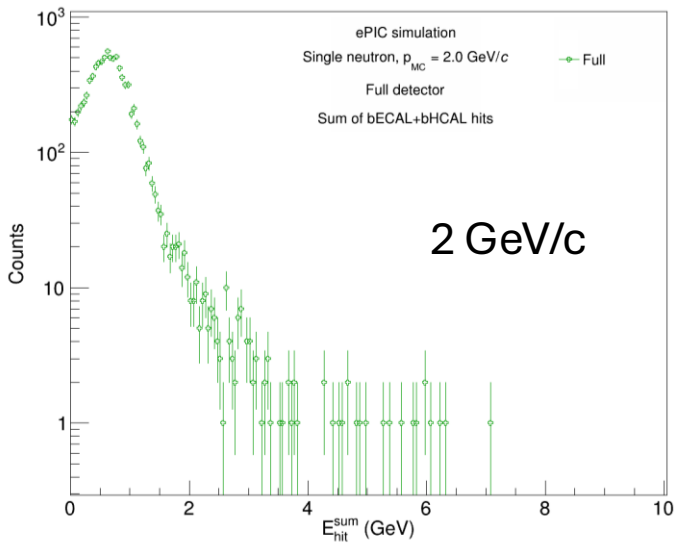
Neutron Calibration

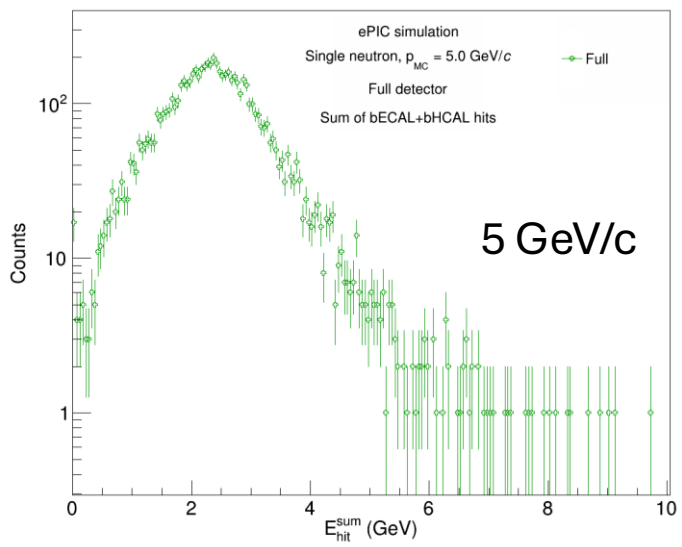
Jan Vanek
Univ. of New Hampshire

- 10k neutrons per energy
- $33.5^{o} < \theta < 146^{o}$
- Full azimuth

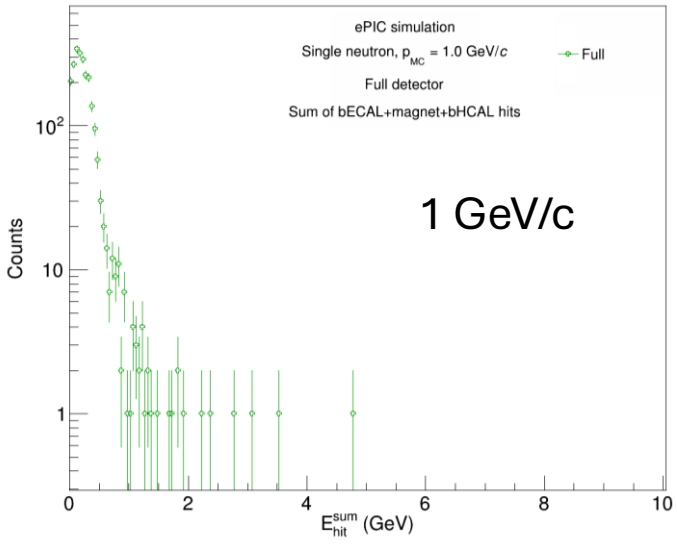
bECal+bHCal

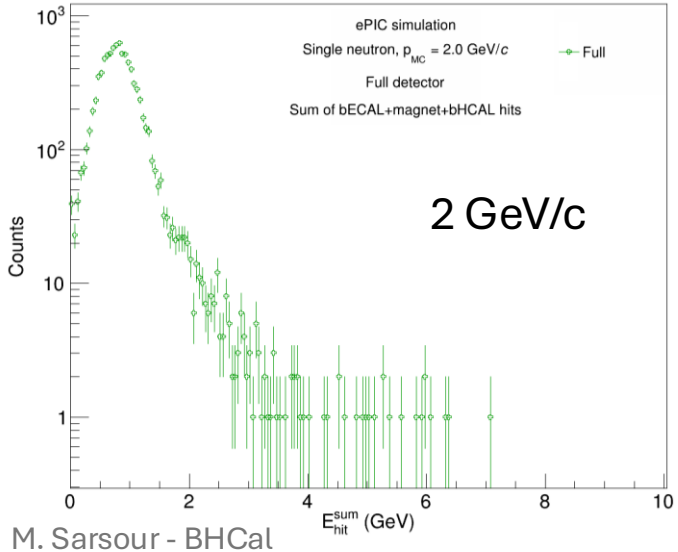


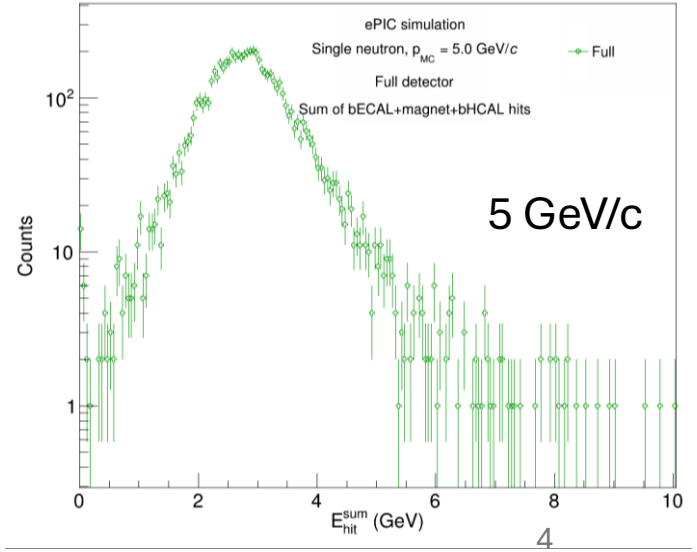




bECal+bHCal+ Magnet





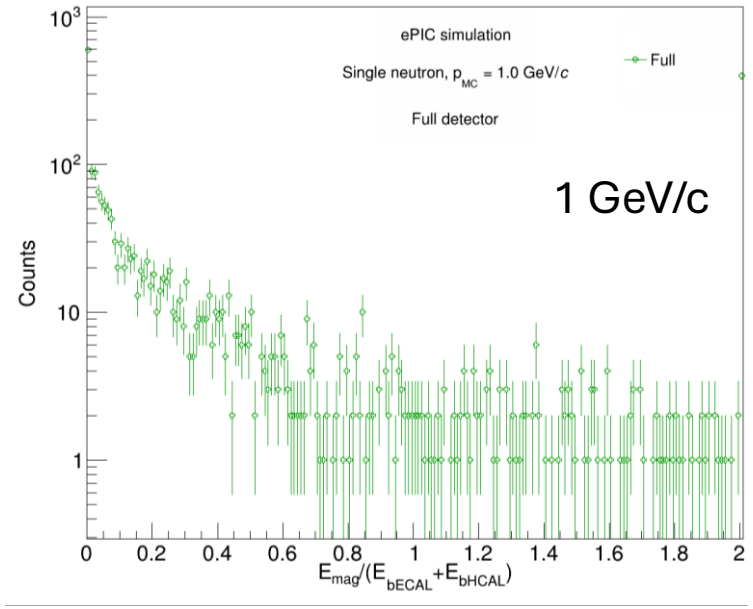


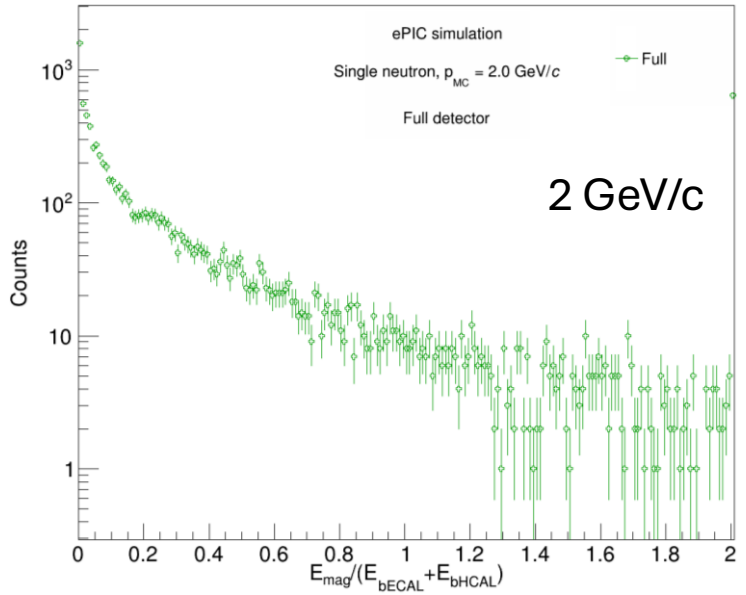
Neutron Calibration

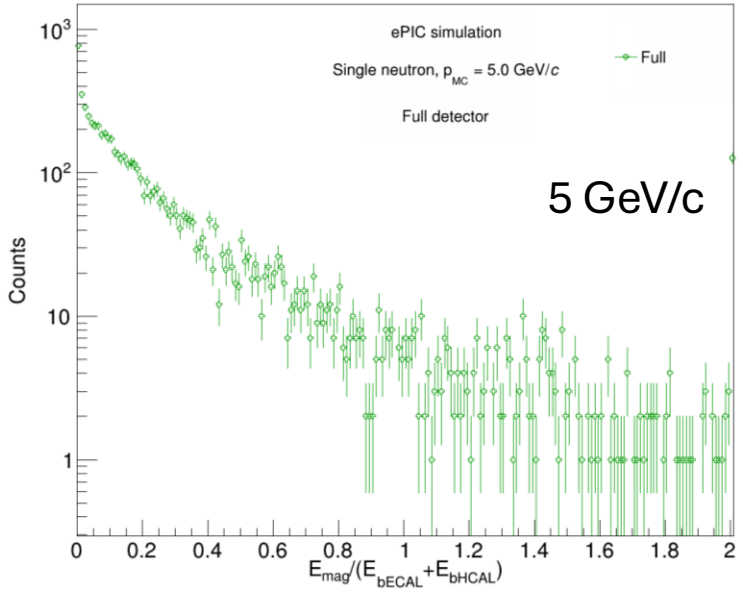
Jan Vanek
Univ. of New Hampshire

- 10k neutrons per energy
- $33.5^{\circ} < \theta < 146^{\circ}$
- Full azimuth

Magnet







Energy lost in the magnet is not large, but is enough to complicate energy determination, especially at low neutron energies (1 GeV/c)