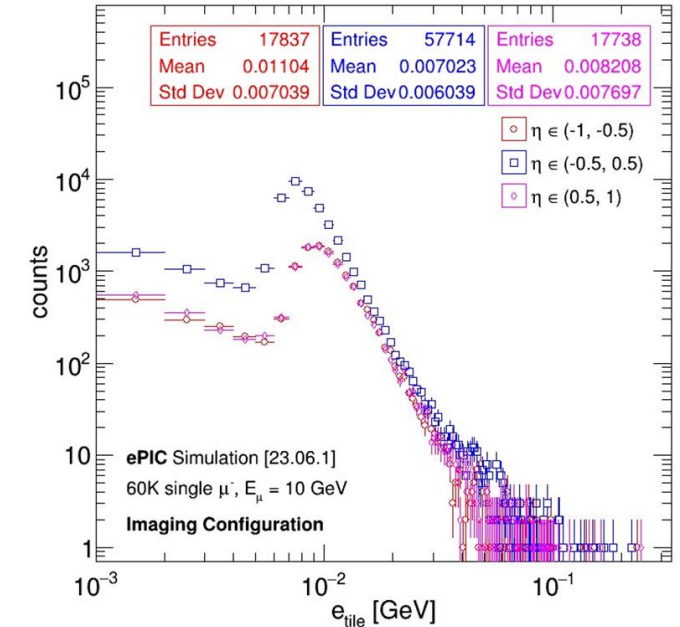
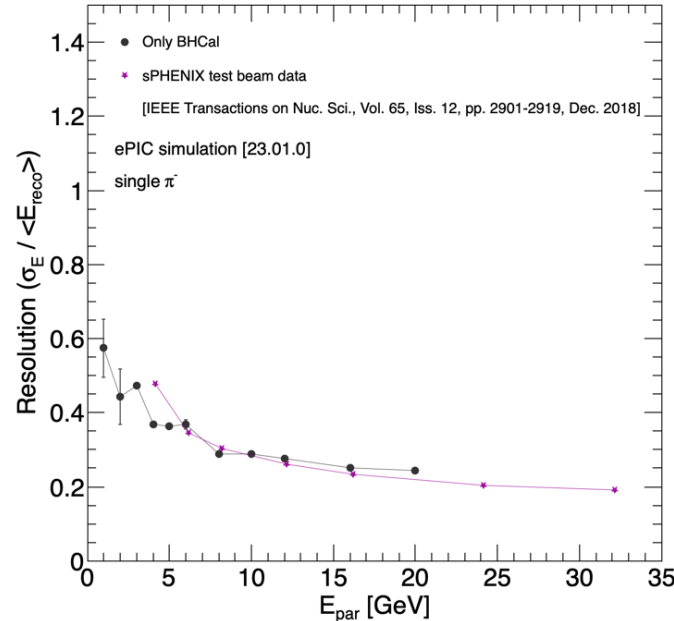
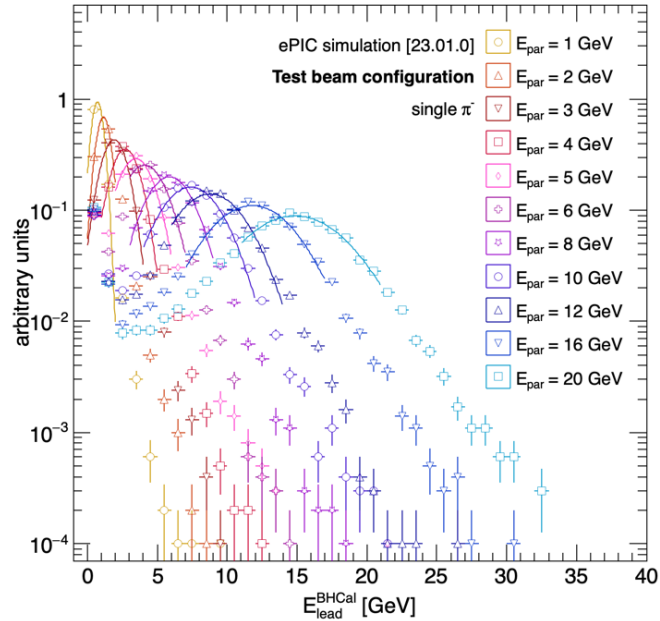


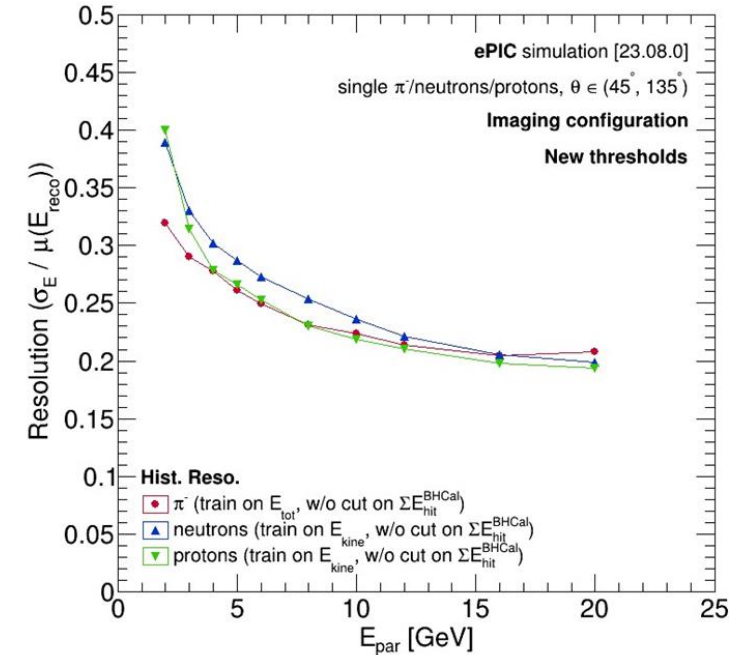
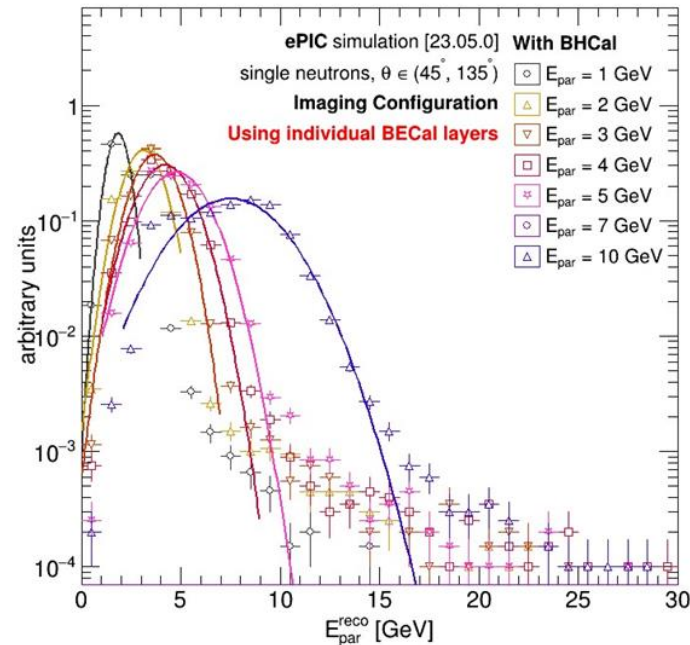
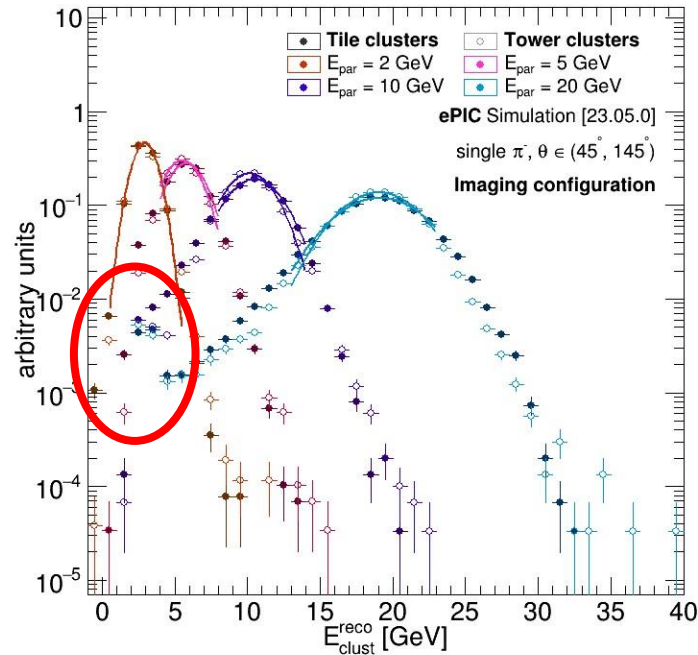
# ePIC BHCAL Meeting | Overall Simulation Status



- Simulation + Reconstruction largely stable since early 2023:
  - 1) Switched to reading out tiles in April 2023 [[EICrecon#598](#)]
  - 2) Significant improvement in realism, simplification of readout in March 2024 [[epic#588](#), [EICrecon#1240](#)]

- **Upshot:** bulk of work was on ML calibration studies
  - ML calibration produced reasonable results for single pions, **but needs refinement**
  - Ran additional low-level checks (e.g. dynamic range calculations w/ single muons)
    - ☞ See John's [slides](#) & [EICrecon#883](#)

# ePIC BHCAL Meeting | ML Calibration (1/2)



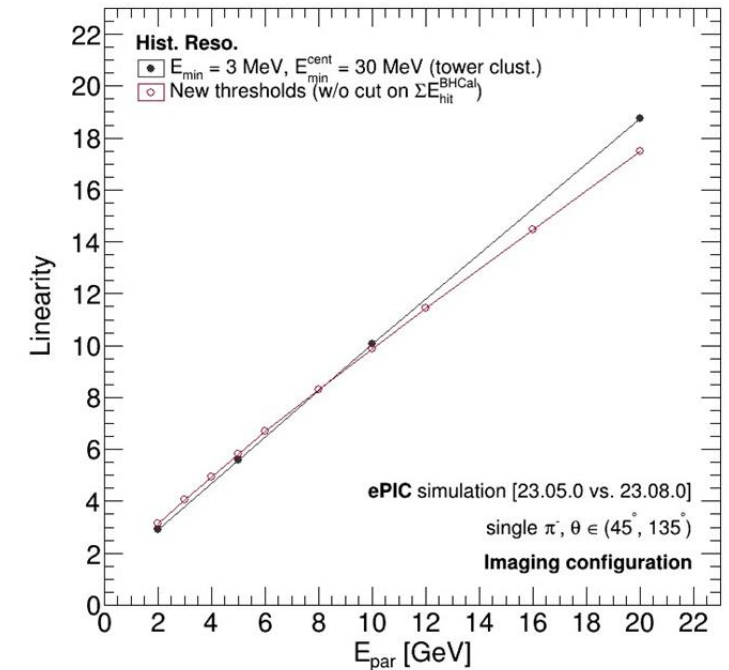
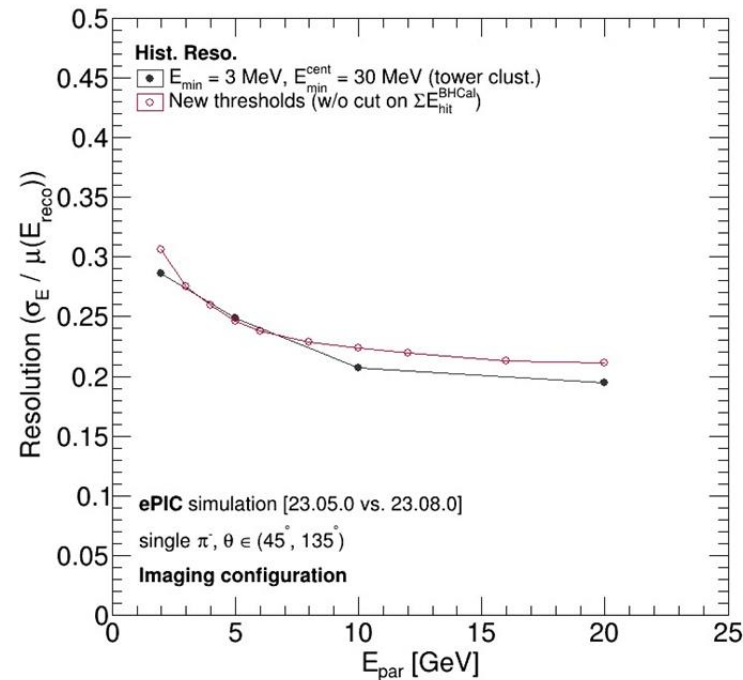
- All of my code can be found on my [GitHub](#)
  - Gist is:
    - 1) Information from the BHCAL and BIC is [collected into tuples](#)
    - 2) Which is then [processed by TMVA](#)
  - TMVA Parameters in backup

- Was producing reasonable results with single pions
  - But some features were not understood (e.g. peak at low energy)
  - And had just started to experiment with applying model to  $n, p$  (needs work!)

# ePIC BHCAL Meeting | ML Calibration (2/2)



- **Another unresolved item:** saw a degradation in energy resolution when moving to tile-based readout
  - Was not fully understood when we paused study
  - Would be interesting to revisit now that cluster-merging is almost in EICrecon...



# ePIC BHCAL Meeting | Studies To-Do and Questions



**Various To-Do Items:** was mostly thinking about pTDR items when preparing this list...

- Resolve impact of tile readout on energy resolution
- Verify muon identification
- Improve proton, neutron calibration
- Neutron identification
  - › How does reading out every tile impact our ability to measure neutrons?
- Impact of BHCAL on JES/JER
- Impact of BHCAL on event kinematics (i.e. JB)
- Implementing rules-based cross-check
- Barrel-forward transition region
  - › Could we extend the studies here to look at particles in the transition region?
  - › Going to be tricky...
- Exploring upgrade paths
  - › e.g. extending depth of tiles in LD, HD regions

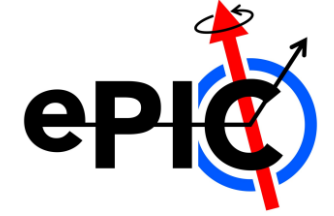
## **pTDR critical items:**

- **Red** = target is end-of-summer/early fall
- **Purple** = target is mid-to-late fall

## **Not pTDR critical items:**

- **Blue** = reasonable to develop/study in near term
- **Grey** = speculative/very, very long term

# Backup | TMVA Parameters



## Parameters

- Règsêşşîon ăñălyşîş
- Ţsăîñêđ ộñ êwêñţş
- ñêţhộđş ăll' ộựţ ộğ ấhê cộy
  - ă Líñêăş Dîşçşîñîñăñţ şhộxñ
  - č NLR ñêụsăl ñêţxộsl
  - ç Bộộşţêđ Dêçîşîon Ţsêê

## Training Variables

- Êñêşgỳ ộğ lêăđîñg BHCăl ăñđ BÉNC çlụşţêşş
- Éţă ấhî ộğ lêăđîñg BHCăl ăñđ BÉNC çlụşţêşş
- Nộ ộğ hîţş ìñ lêăđ BHCăl ăñđ BÉNC çlụşţêşş
- Şụñ ộğ êñêşgỳ ìñ ìñăgîñg ăñđ ŞçîGî lăyêşş

## Target

- ấştíçlê êñêşgỳ