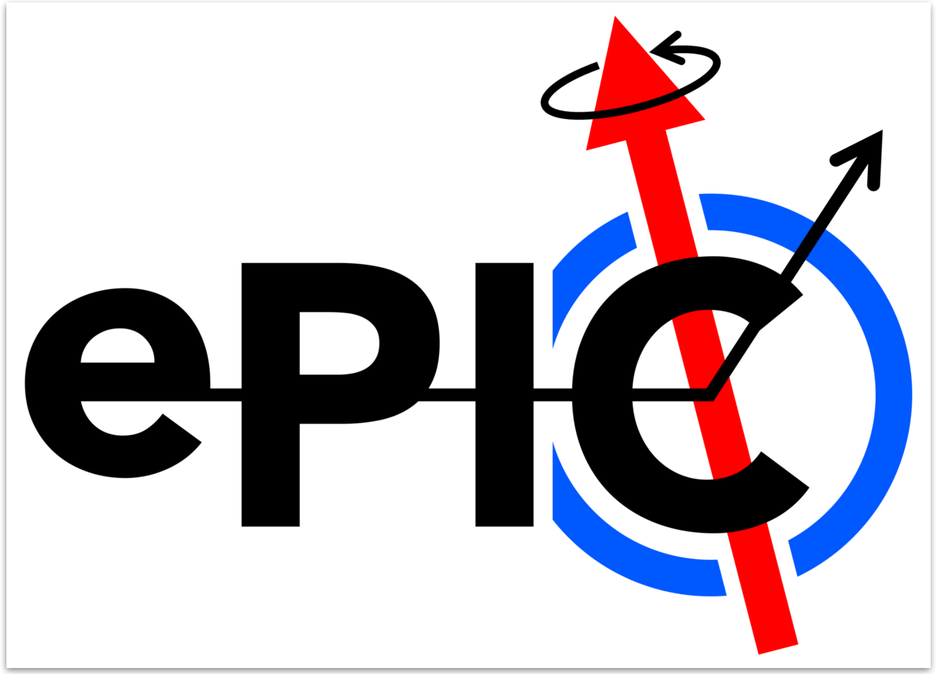


# Muon ID with the nHCal

First brainstorming

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ILLINOIS

# Introducing Kira Richards

- Incoming UIUC grad student from Iowa State
- Experience with sPHENIX EMCal simulations (on BNL SDCC)
- About to start working on ePIC nHCal simulations for at least this summer
- Joined ePIC Mattermost, applied for ePIC GitHub membership and ePIC SDCC computing account

# Muon ID with the nHCal - particle gun

- **Particle gun, single muons**
  - Scan energies and nHCal geometries, and produce the following distributions for each configuration
  - (Are muon decays simulated?)
- **Track level**
  - ($\eta$,$\phi$) and momentum distributions
  - Tracking efficiency
- **Cluster level**
  - (x,y) and energy distributions of nHCal-clusters matched to muon tracks
  - Sampling fraction - what fractional energy of the incident muon is deposited in the nHCal? vs. muon incident energy
  - Efficiency - “what fraction of the tracked muons leaves a cluster of sufficient energy?” What is “sufficient”? - efficiency vs. incident muon energy for different minimum energy thresholds
  - Purity - impossible with particle gun?! It is a pure muon sample…

# Technical notes

- Who will produce the single muon MC? Do we have a framework we can use?
  - Derek and Peter, for example, have such framework
- Need to expand our existing code to cluster level & track-cluster matching. Learn from Alexander Godál's experience
  - see also Mattermost Helpdesk https://chat.epic-eic.org/main/pl/3wdfmtsym3b7u8apkdytrfc8kc
- Use tracking efficiency code (which we adapted from the ePIC tutorial) and adapt it to cluster level
- Start coding in stand-alone mode
  - eventually, merge with Leszek's code https://github.com/lkosarz/HCalGeomStudy
- Target for "first solid results": end of June; full study including other event generators by end of summer (pythia, Sartre, lAger, …)
  - can somebody remind me what was special about end of June?
- General note: nHCal geometry implementation not realistic - "disc of trapezoids", instead want to aim for module simulation (x, y). Could start with mirroring LFHCal?