# EPIC detector performance studies
# - DD4hep and eicrecon -

**EPIC Tracking Meeting**
**December 8, 2022**

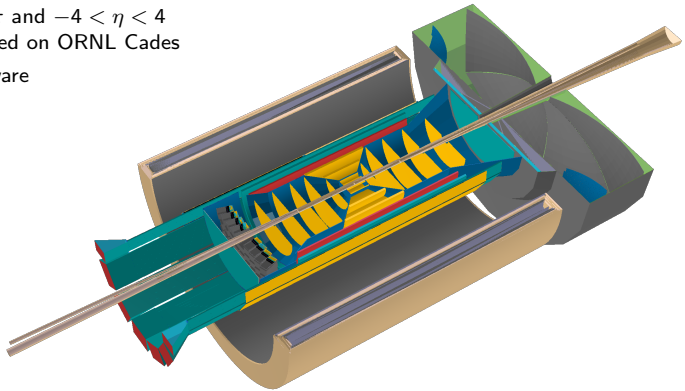
**Nicolas Schmidt**

EPIC
Electron Proton and Ion Collider
EXPERIMENT

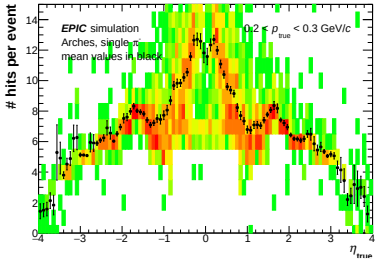
OAK RIDGE
National Laboratory

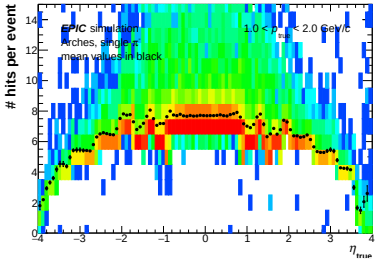
# Simulation setup

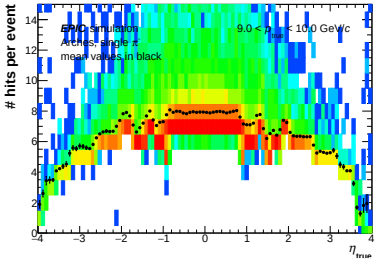
- Arches with only tracking systems
  → caveat: backwards TTL layer included for these studies
- Single particle simulations:
  → flat in $0.1 < p < 10$ GeV, $0 < \varphi < 2\pi$ and $-4 < \eta < 4$
  → 4M events per detector setup generated on ORNL Cades
- Reconstruction with latest eicrecon software
  → truth seeded ACTS tracking

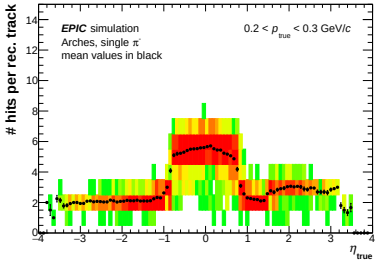


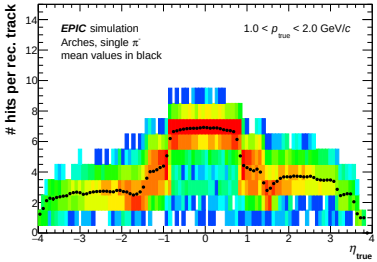
# Hits per event and per rec. track with ACTS

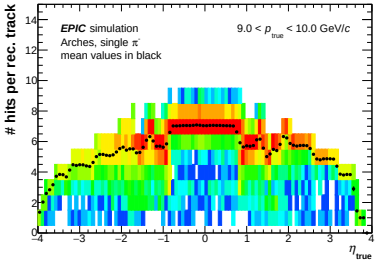


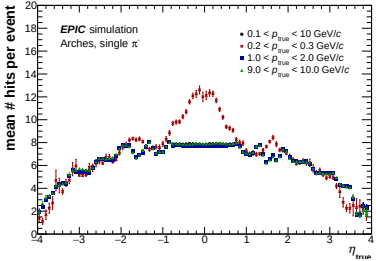



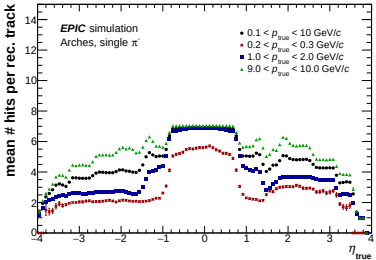



# Hits per event and per rec. track with ACTS




## Information shown in plots:

- Hits per event:
  → all hits saved for
  "SiBarrelHits", "MPGDBarrelHits",
  "VertexBarrelHits",
  "TrackerEndcapHits",
  "TOFEndcapHits", "TOFBarrelHits",
  "MPGDDIRCHits"
- Hits per track:

```
auto acts_results = event->Get<edm4eic::TrackingResultTrajectory>("CentralCKFTrajectories");
for (const auto& traj : acts_results) {
    const auto &mj = traj->multiTrajectory();
    const auto &trackTips = traj->tips();

    const auto &trackTip = trackTips.front();
    auto trajState = Acts::MultiTrajectoryHelpers::trajectoryState(mj, trackTip);
    if (traj->hasTrackParameters(trackTip)) {
        int  m_nMeasurements = trajState.nMeasurements;
    }
}
```