Recap and feedback from collaboration meeting

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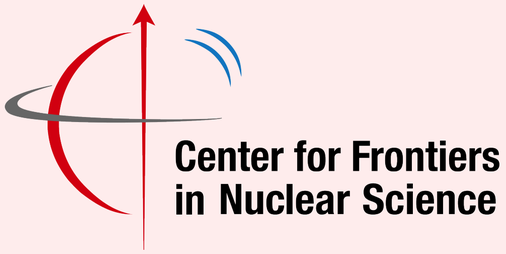
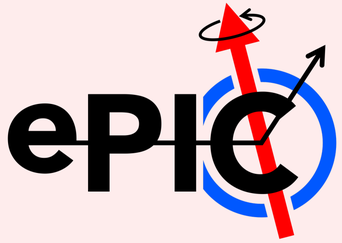
Inclusive PWG meeting
01/26/2026





Recap

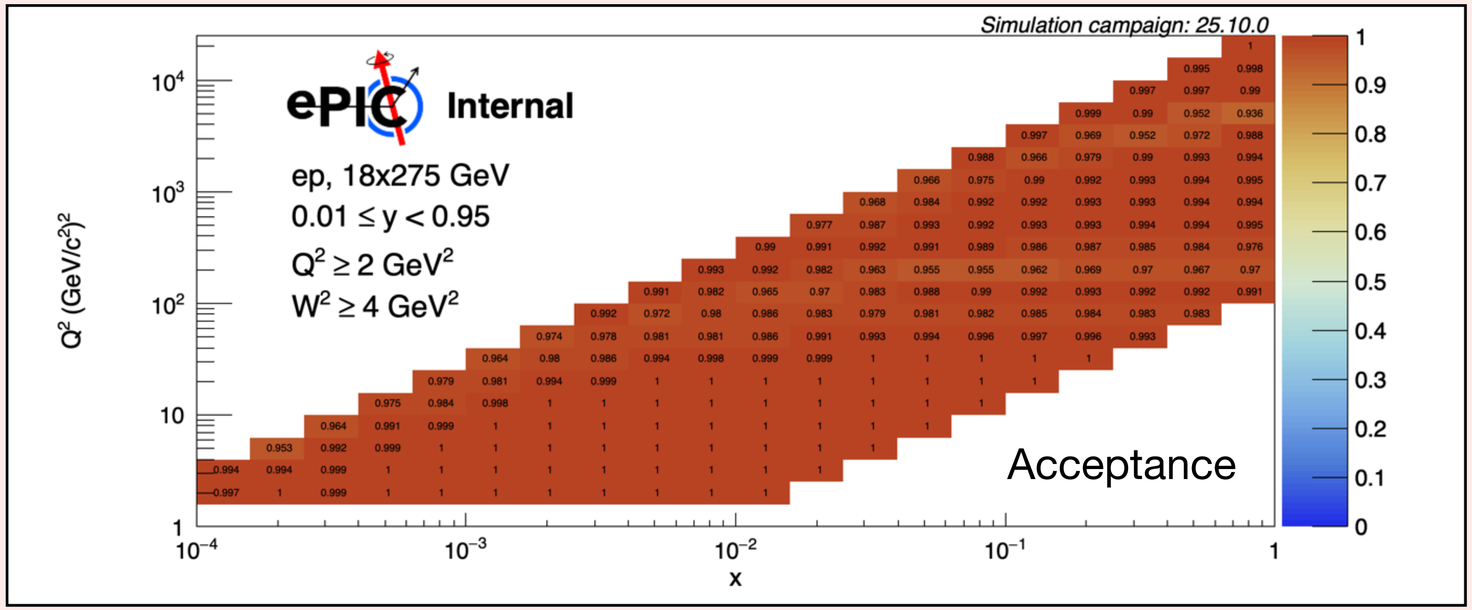
We highlighted our effort on:

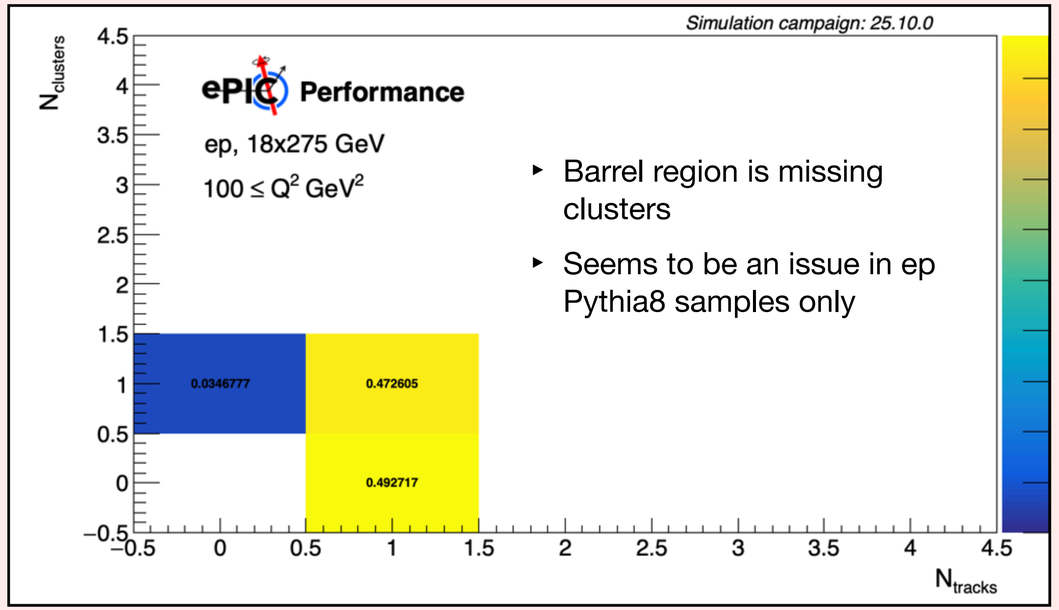
- physics projections for EIC early science
- electron finder development
- systematic estimates
- radiative corrections

Priority for Spring 2026:

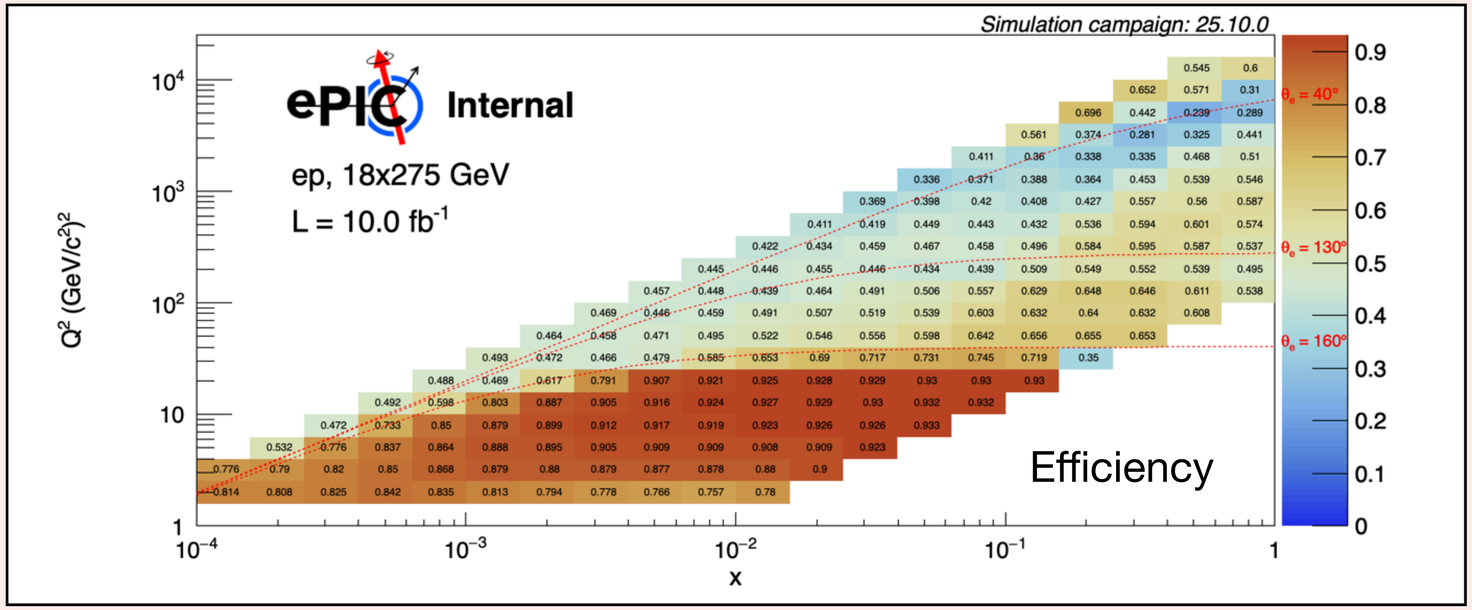
- Early science report
- Issue with clusters for ep samples
- Update electron reconstruction in EICrecon

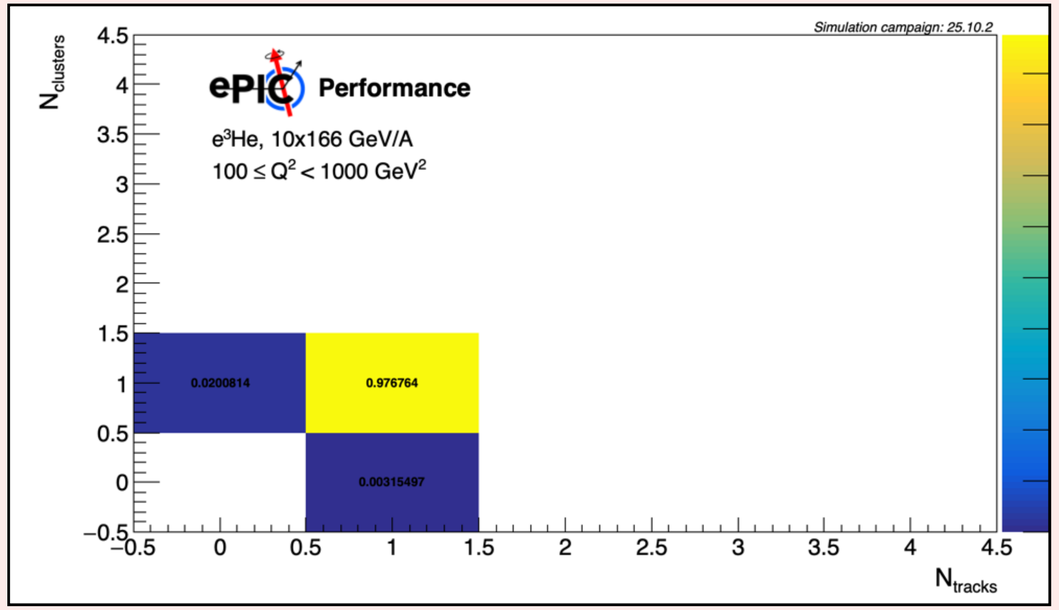
eID recap and feedback





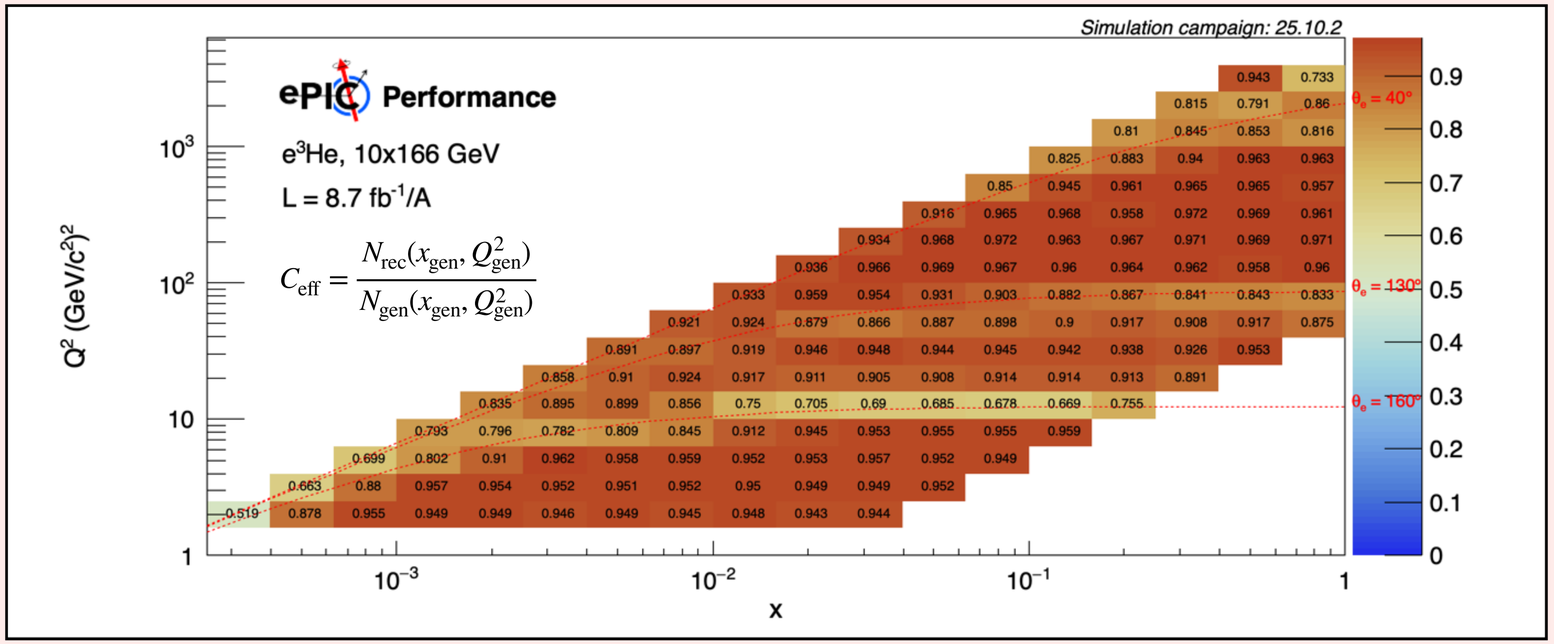
- Barrel region is missing clusters
- Seems to be an issue in ep Pythia8 samples only

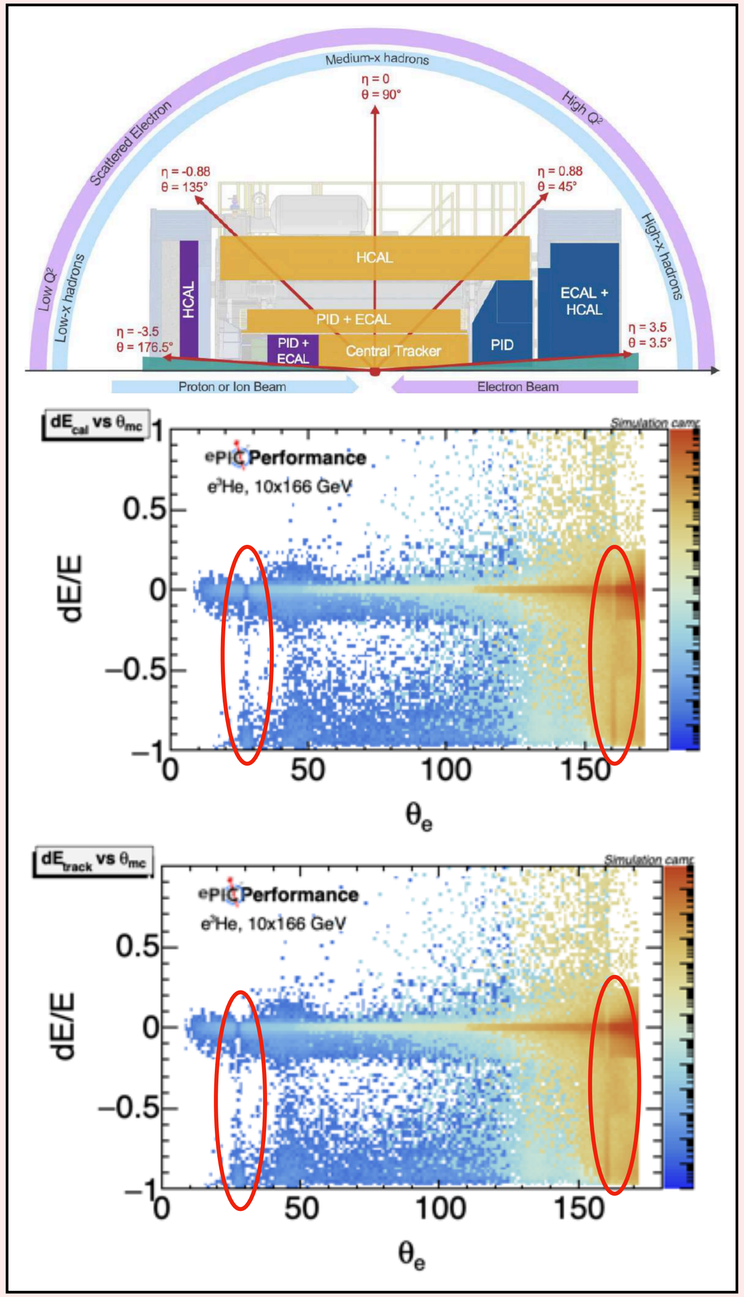




eID recap and feedback

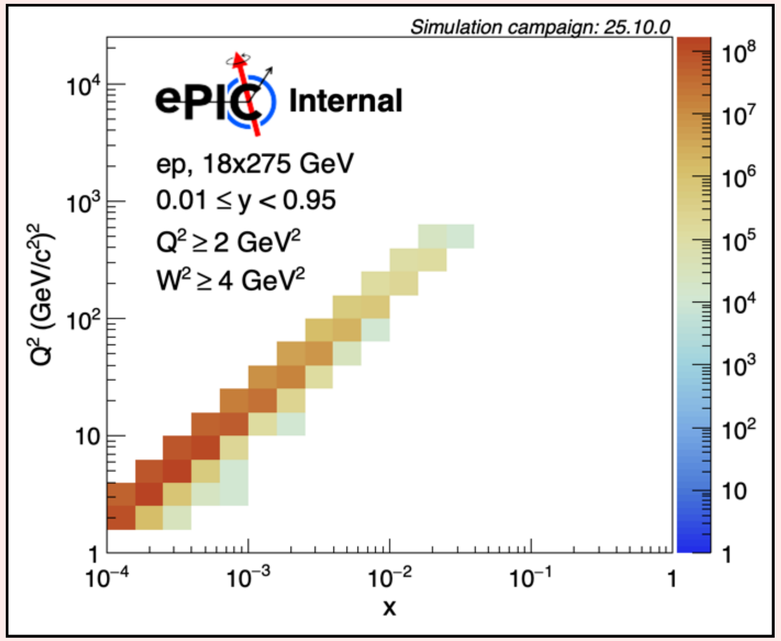
- Where/how are we losing the electrons?
- Energy lost in materials?
- More dedicated cluster analysis might be able to get these events back

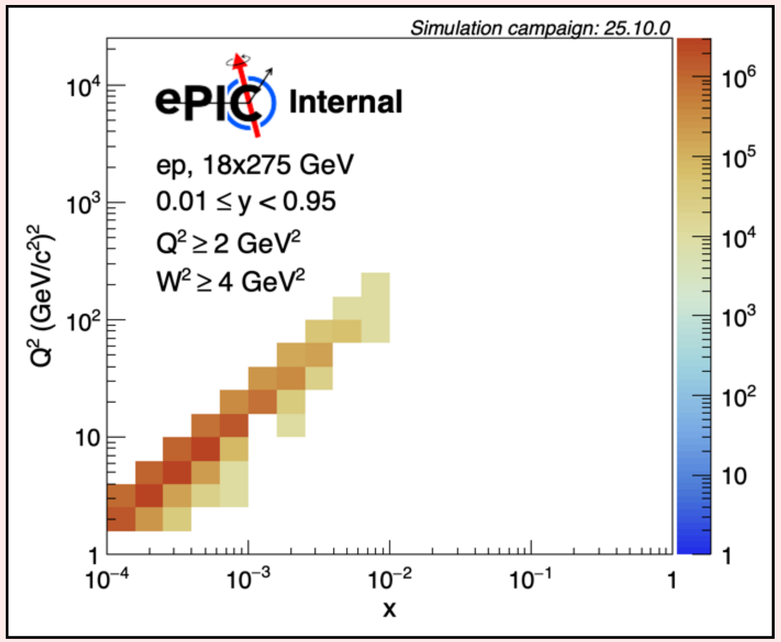


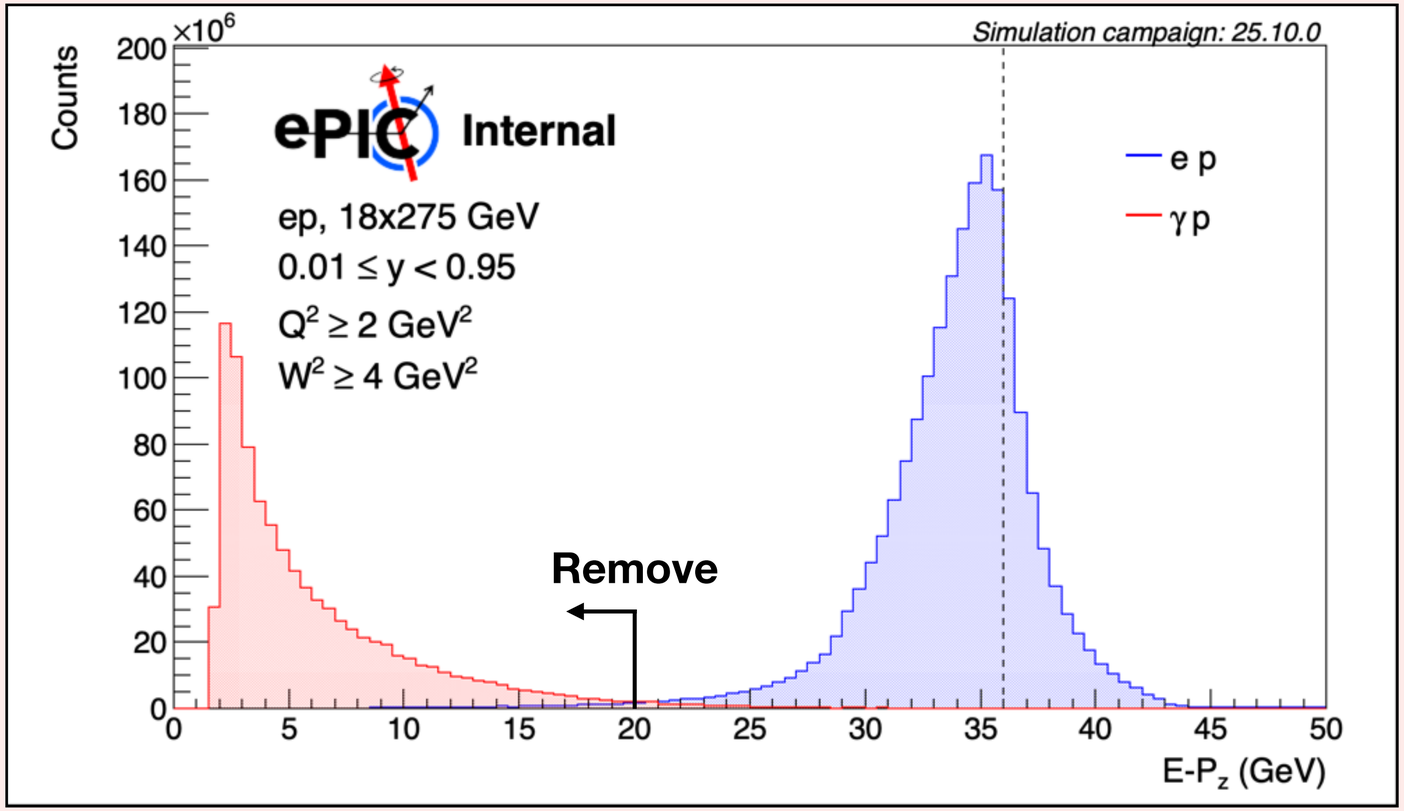


Photoproduction background

Reduced by ~97.95%







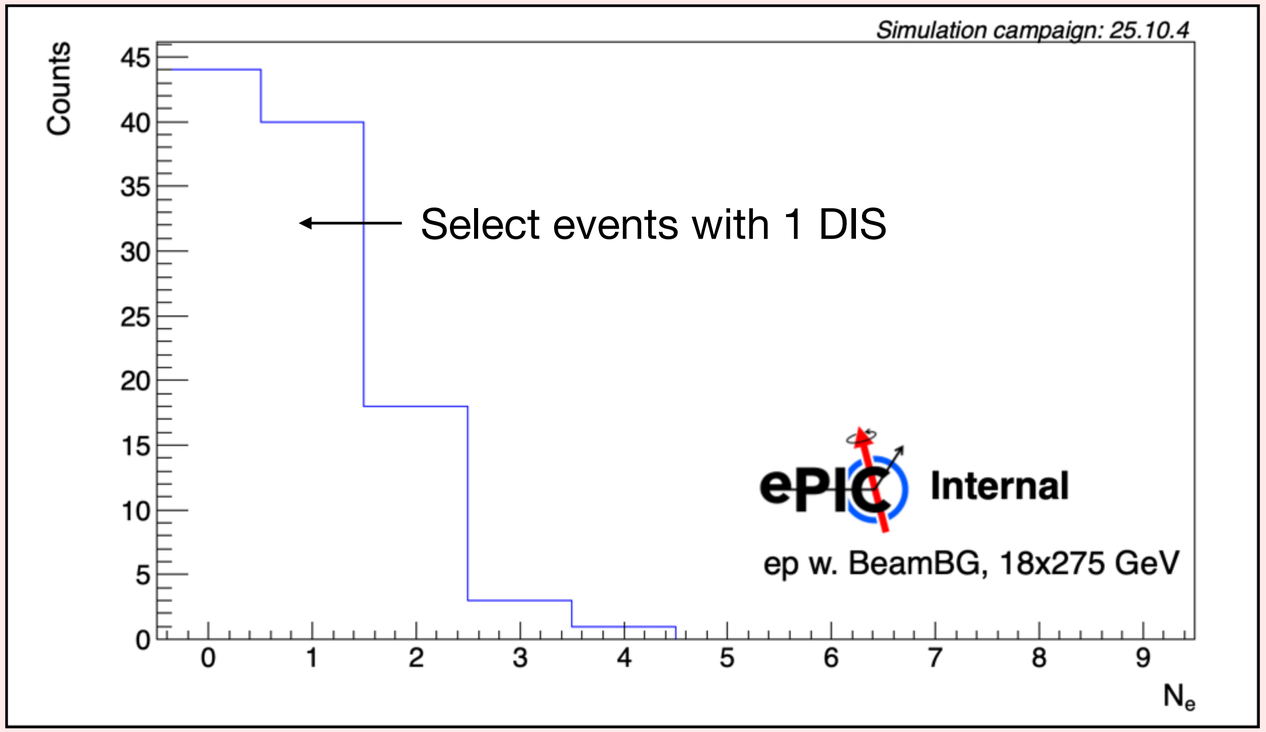
Both samples are scaled to $L = 10\ \mathrm{fb}^{-1}$

- Need to check σ agreement between two generator (Pythia 8 vs 6)
- Use Pythia 6 for this study (simulation samples are available?)

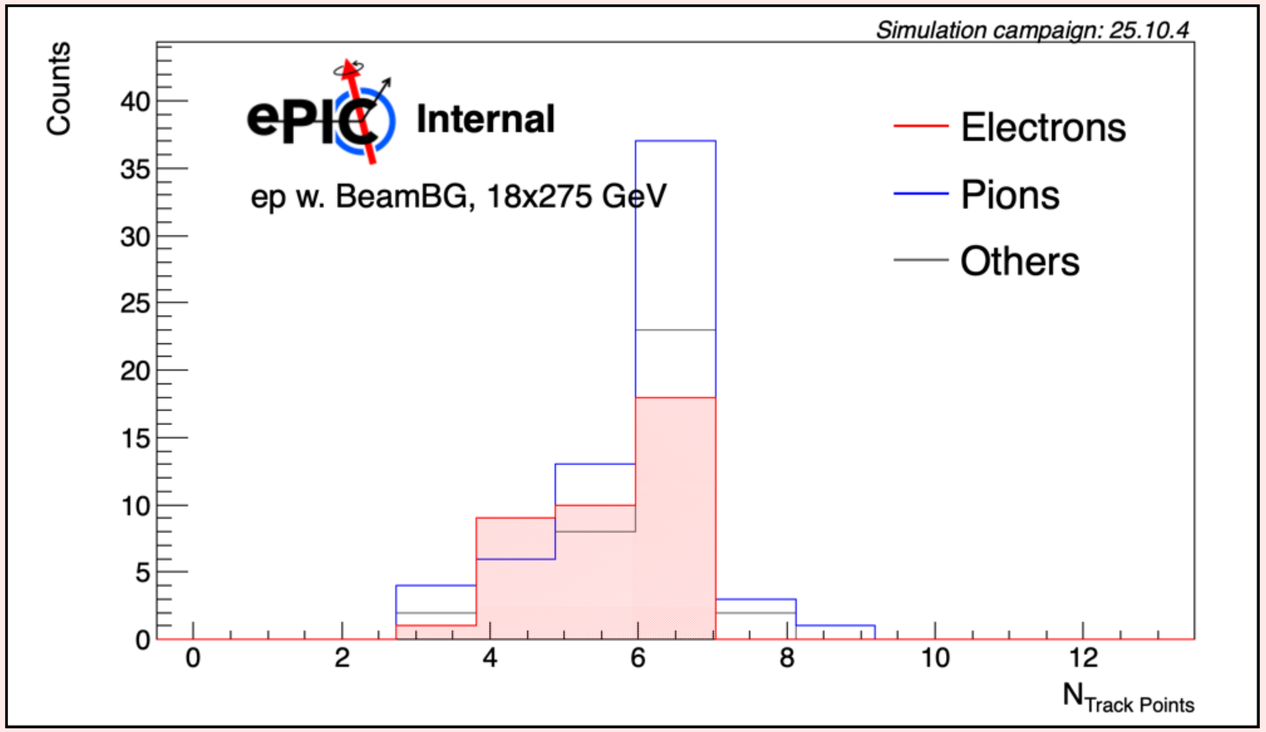
eID with beam background

Machine background samples:
Bkg_1SignalPer2usFrame/
Synrad_18GeV_Vac_10000Ahr_Runtime_50s_Egas_18GeV_Hgas_275GeV/DIS/NC/
18x275/minQ2=1

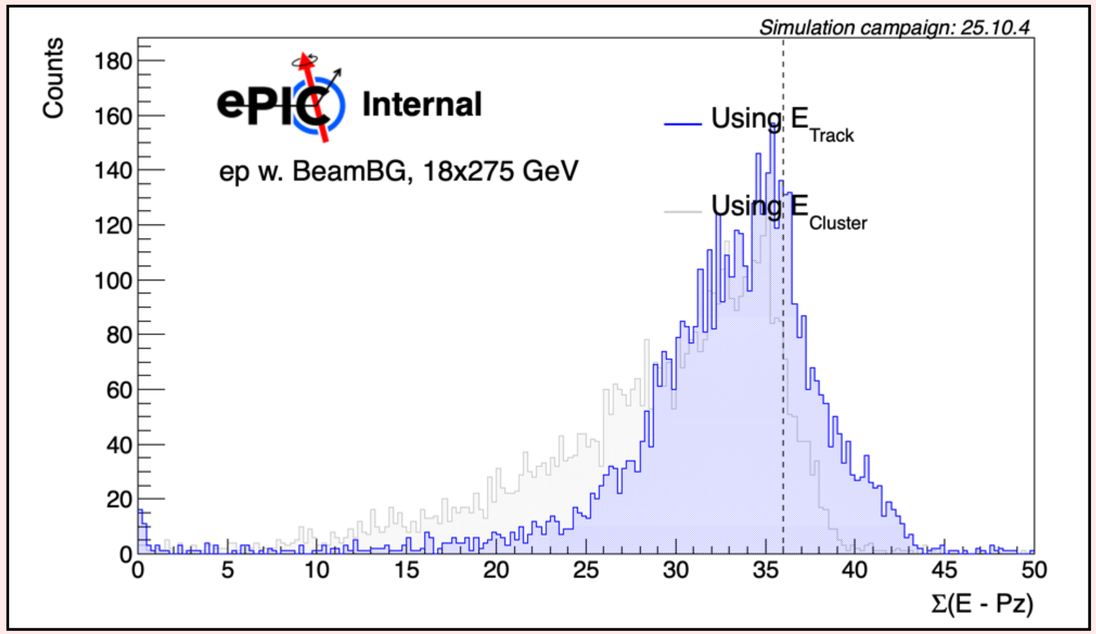
Number of scattered electrons

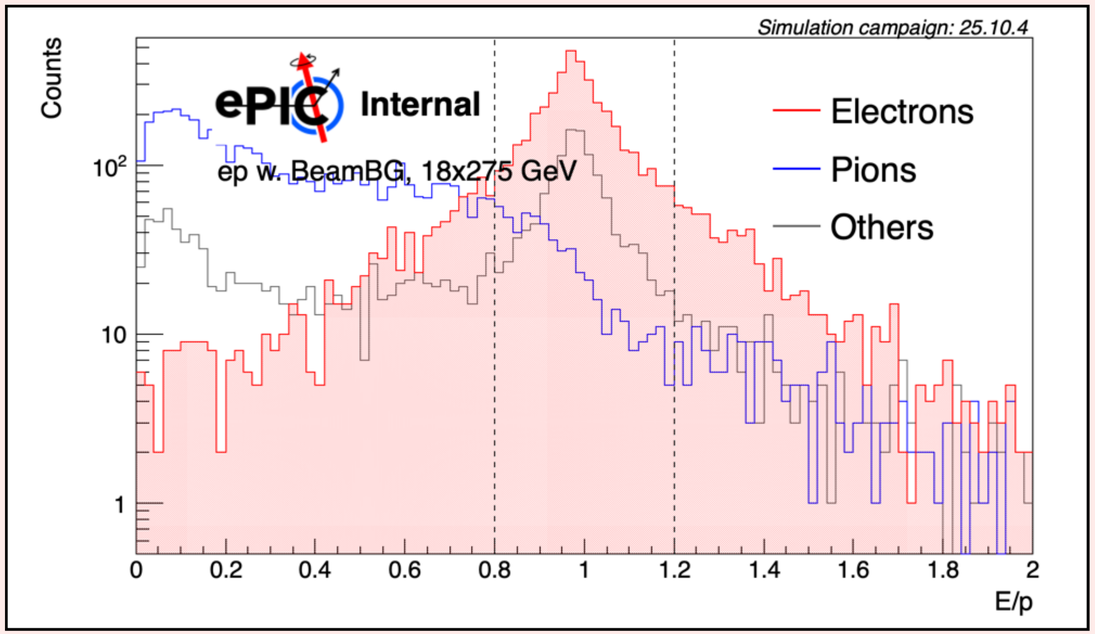


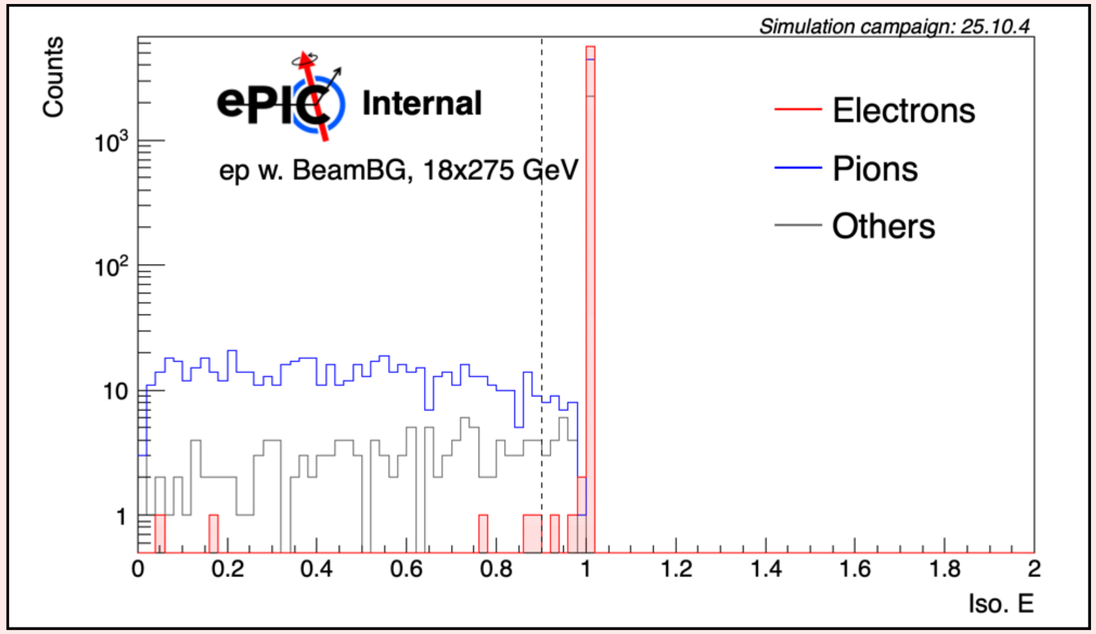
Number of points used for tracks

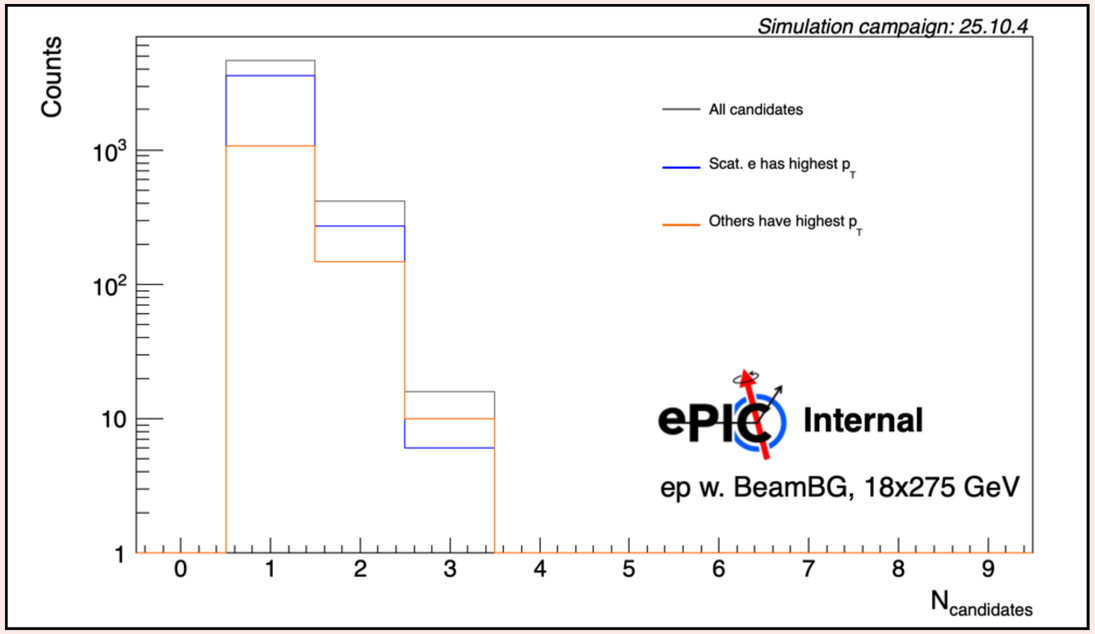


eID with beam background - 1 DIS events, > 3 track points

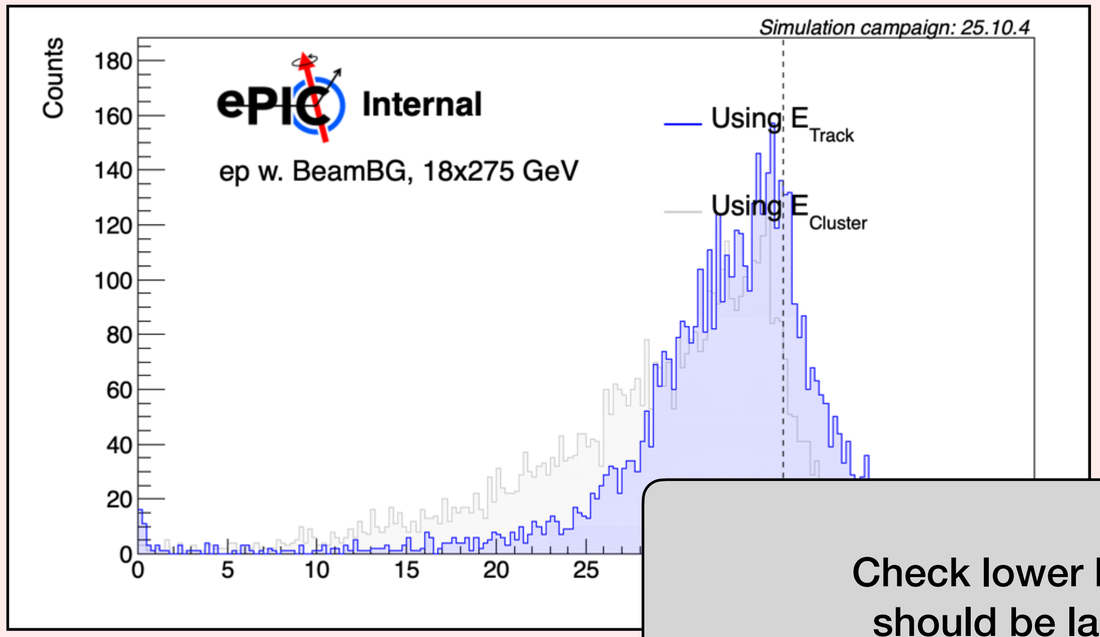


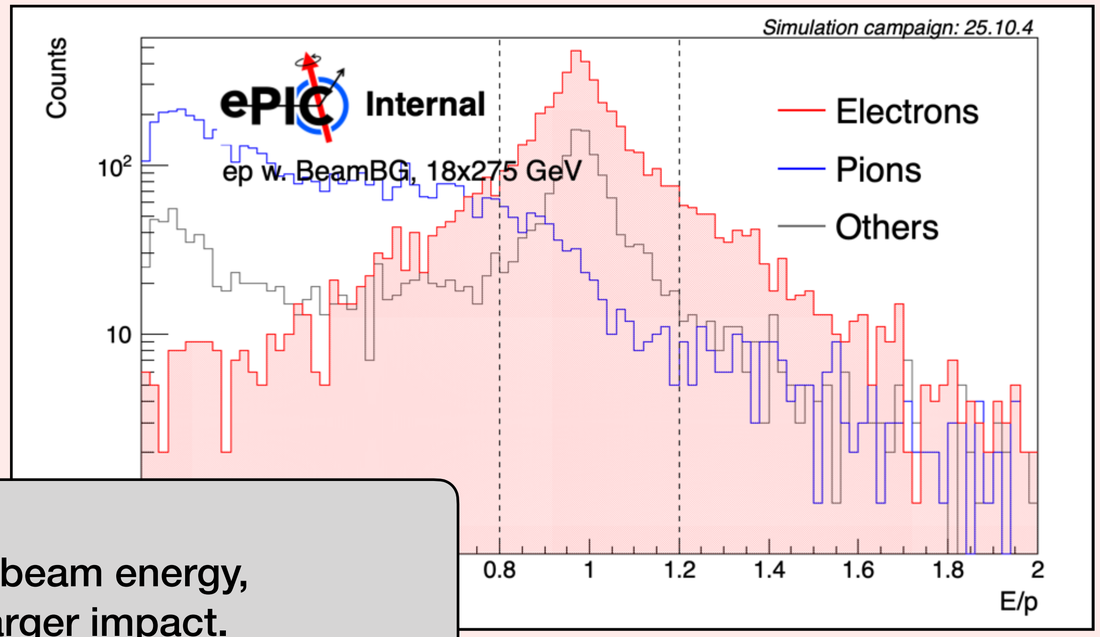




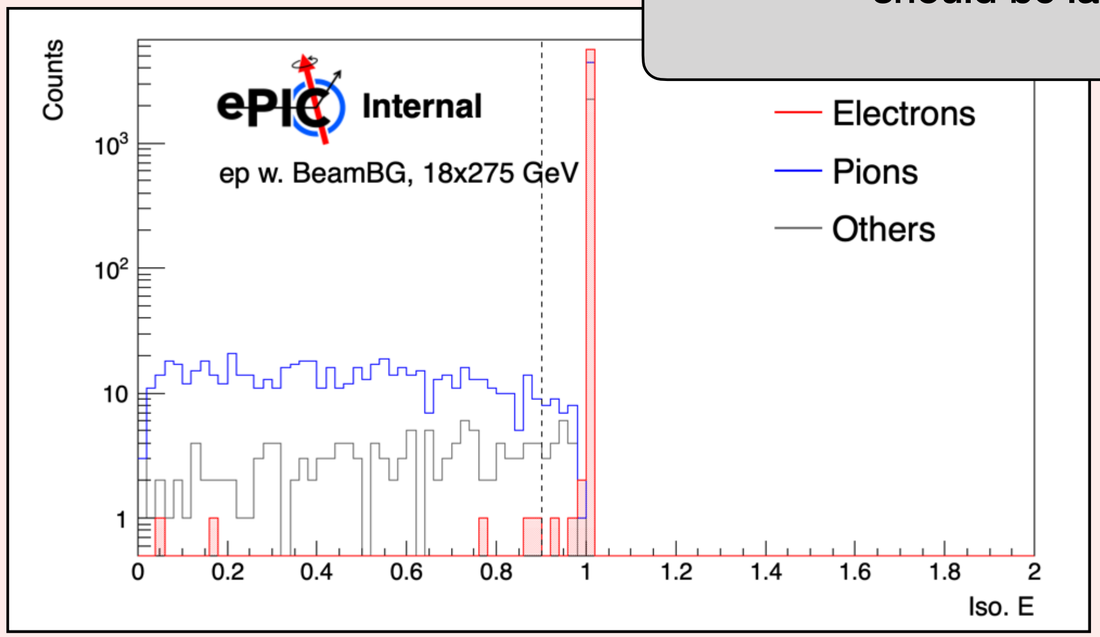


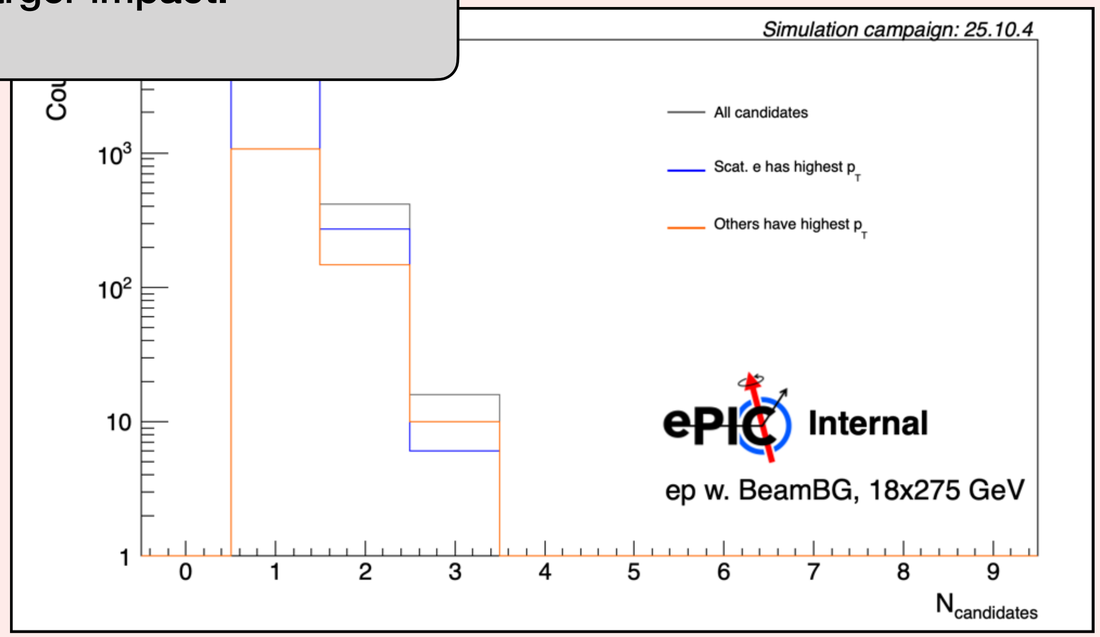
eID with beam background - 1 DIS events, > 3 track points





Check lower beam energy,
should be larger impact.





eID Tasks | Toward Milestone 1

Task	Description	Notes	Assignees
eID0	Resolve missing EMCal-track associations		Barak, Win, **Help**
eID1	Resolve issues with boost.h	EICrecon#2331	Win
eID2	Add isolation cut to ElectronReconstruction	EICrecon#2332	**Help**
eID3/PFA-1	Deprecate MatchClusters, replace with pure reco equivalent	EICrecon#1956	Tristan
eID4	Wire reco DIS electrons into kinematic calculations (step 1)	EICrecon#2333	**Help**

Milestone 1: there are well-defined steps to bring EICrecon e^--finder to next level, meaning that

1. Updates are integrated from Inclusive PWG's prototype code, and
2. Use of truth information is removed.

ETA: end of CY26.Q1 ***(cond. on workforce)***

- **Help** indicates where additional workforce is needed
- Tasks are decoupled and can proceed independently
- **eID4** has synergy with **Event Kinematics** reconstruction priority
- **Note:** reco kinematics *do not* have to be made default until collaboration is ready

eID Tasks | Toward Milestone 2

Task	Description	Notes	Assignees
eID5	Wire reco DIS electrons into kinematic calculations (step 2)	ElCrecon#2333	**Help**
eID6	Improve DIS selection (adding p_T ranking, etc.)		TBD
eID7	Improve kinematic calculations (handling different beams)		TBD
eID8/PFA4	Integrating PFAlpha + eID		TBD

Milestone 2: tasks still require elaboration. But can identify high-level steps towards next major milestone, which will be partly defined by integrating PF and eID.

ETA: end of CY26.Q3 ***(again cond. on workforce)***

- **TBD** indicates task needs elaboration
- **eID7** has synergy with **Event Kinematics** reconstruction priority
- These tasks might be better done sequentially to assess impact
- **Note:** PFAlpha aiming for implementation + tuning by end of CY26.Q1

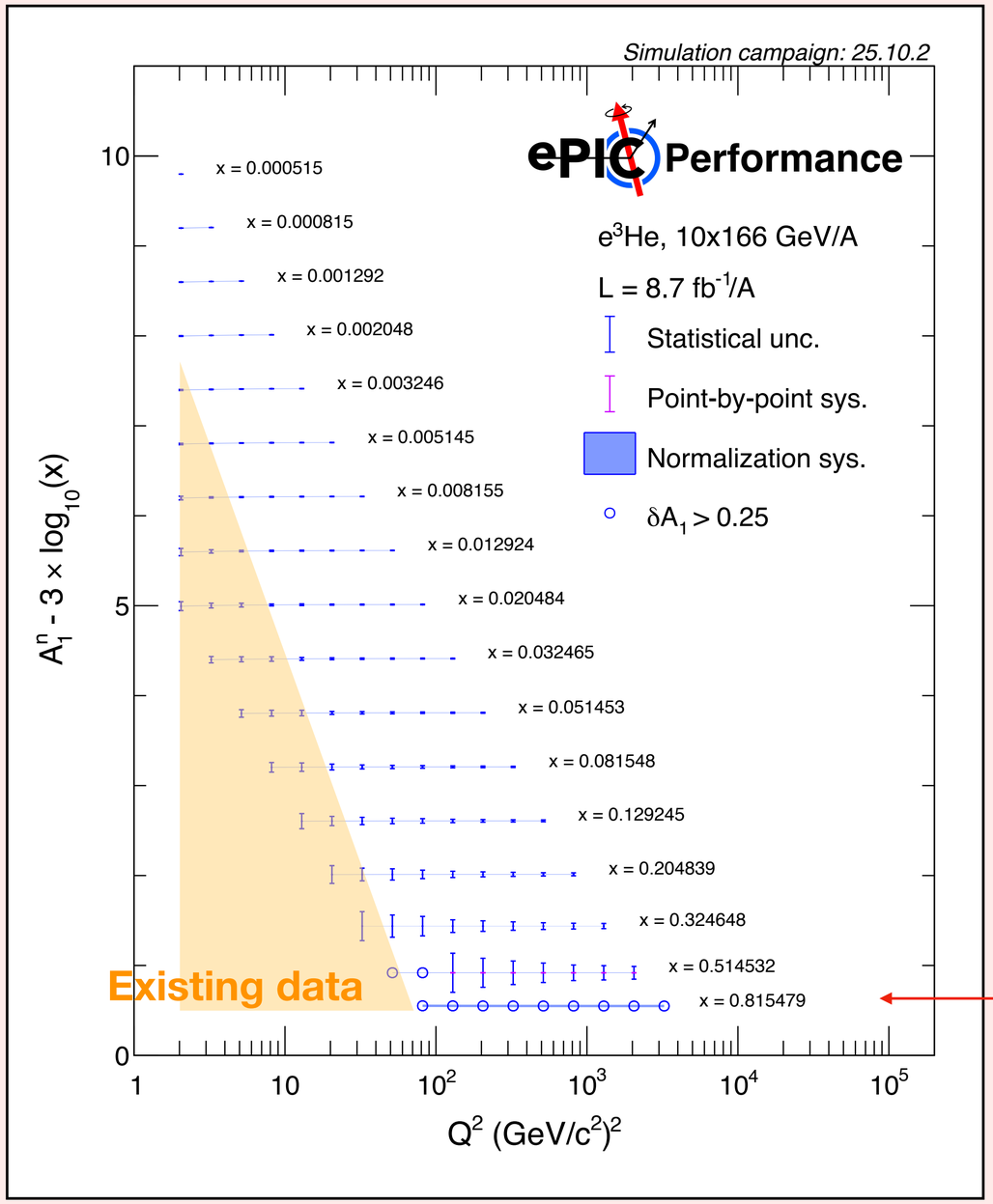
EICrecon to do

EICrecon/src/algorithms/reco/InclusiveKinematicsElectron.cc

```
79      // Get incoming electron beam
80      const auto ei_coll = find_first_beam_electron(mcparts);
81      if (ei_coll.empty()) {
82        debug("No beam electron found");
83        return;
84      }
85      const PxPyPzEVector ei(round_beam_four_momentum(ei_coll[0].getMomentum(),
86                                                      m_particleSvc.particle(ei_coll[0].getPDG()).mass,
87                                                      {-5.0, -10.0, -18.0}, 0.0));
88
89      // Get incoming hadron beam
90      const auto pi_coll = find_first_beam_hadron(mcparts);
91      if (pi_coll.empty()) {
92        debug("No beam hadron found");
93        return;
94      }
95      const PxPyPzEVector pi(round_beam_four_momentum(pi_coll[0].getMomentum(),
96                                                      m_particleSvc.particle(pi_coll[0].getPDG()).mass,
97                                                      {41.0, 100.0, 275.0}, m_crossingAngle));
```

Need to be more flexible

A_1 requirement



- What's the minimum requirement for eID efficiency and purity?

Log(x) might not be the best way to show error bars