Jets&HF Working Group Workfest report/TDR plans

Brian Page & Olga Evdokimov

Collaboration Meeting: Two workfests

Joint tracking + Jets/HF Workfest – Vertexing Session:

1. Primary vertex reconstruction resolution performance
2. Real-seeded tracking with single particles
3. Tracking efficiencies for DIS events

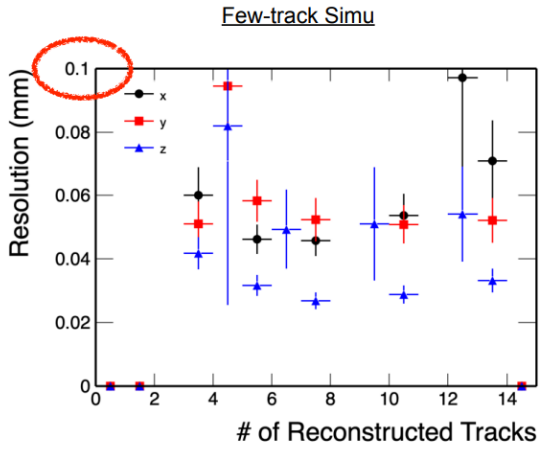
Issue in coordinate transformations (fixed)

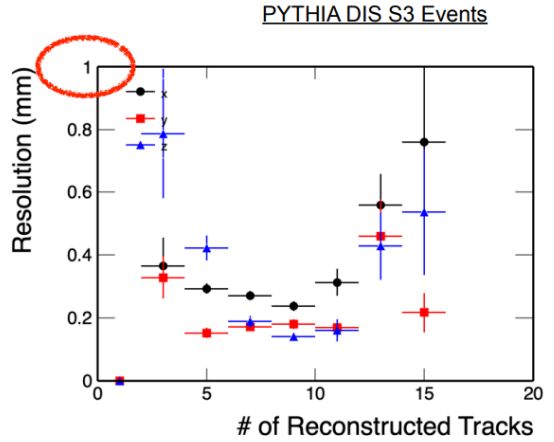
Updates to realistic seeder based on single-particle simulation

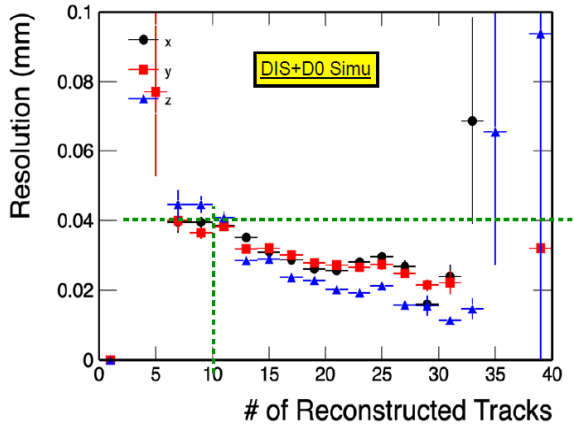
Fix to globalToLocal seed conversion. EICRecon PR #1185

Fix to seed charge calculation. EICRecon PRs #1213, #1214

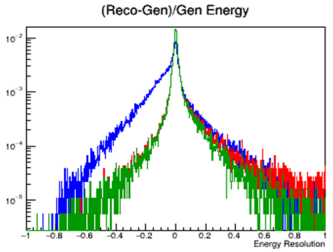
Very productive experience; identified some ongoing issues with the vertexing and track reconstruction; implementation/plans for some fixes were put in place.

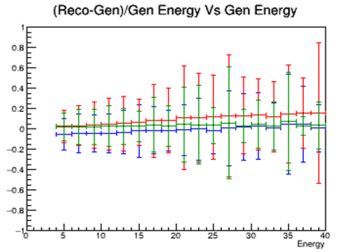


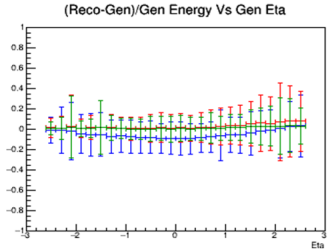


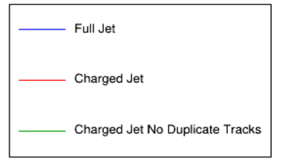


Collaboration Meeting: Two workfests







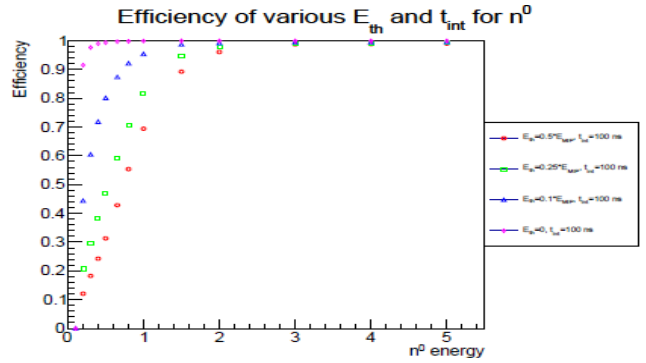


Joint Particle Flow + Jets/HF Workfest Session:

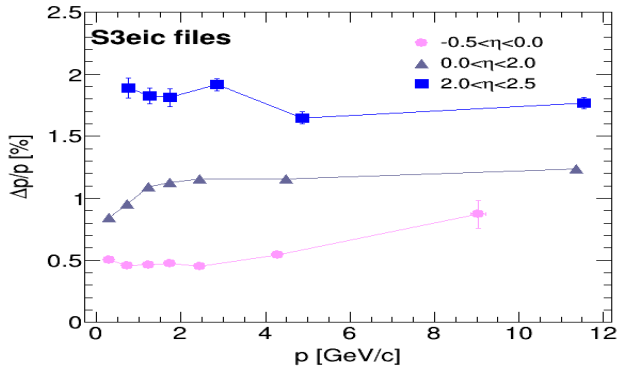
1. Particle flow algorithm / factory status
2. Particle Flow tasks: Visualizer, Downstream validation, Code review
3. Jet Factory Maintenance: Migrate to OmniFactory, new functionality features

Settled on plots for PF algorithm validation (JES/JER, PES/PER, Kinematics, Multiplicity, performance of cluster splitting, performance of track/cluster matching, angular resolution)

Good discussion on backward Hcal and efforts to validate its use in jet reconstruction



Successful session: several issues identified and resolved in a relatively short time; on-boarded several new people; review of eicRecon trees identified missing information for some associations which are defined.



Jets&HF planning for TDR

- We have initial selection of figures to reproduce with full simulation
  - Tentatively, 2 reco performance plots, 2 physics benchmarks
- It would be helpful to understand the “real estate” so we could better focus our (very minimal) manpower efforts
- What about a template for all TDR plots for overall coherency of the document?

Jets&HF planning for TDR

- Jet reconstruction performance:

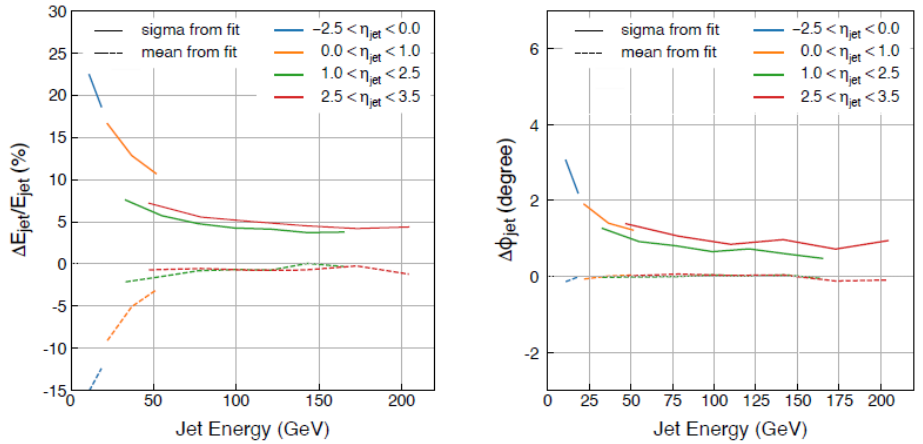


Figure 27: Left: Relative jet energy resolution (solid lines) and jet energy scale (dashed lines) for various pseudorapidity intervals. Right: jet azimuthal angular resolution (solid lines) and bias (dashed lines) for various pseudorapidity intervals (FastSim).

- Brian, ETA ~ early Feb.

Jets&HF planning for TDR

- Vertex reconstruction/dca resolution:

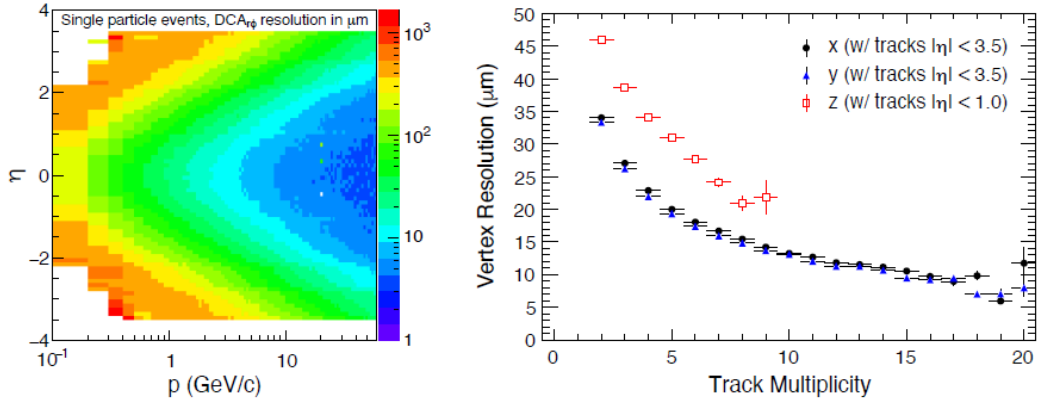


Figure 28: Left: Single charged track distance-of-closest-approach resolution orthogonal to the beam axis (FullSim). Right: Primary vertex resolution as a function of charged track multiplicity along and orthogonal to the beam axes for DIS events within the indicated detector acceptance (FastSim).

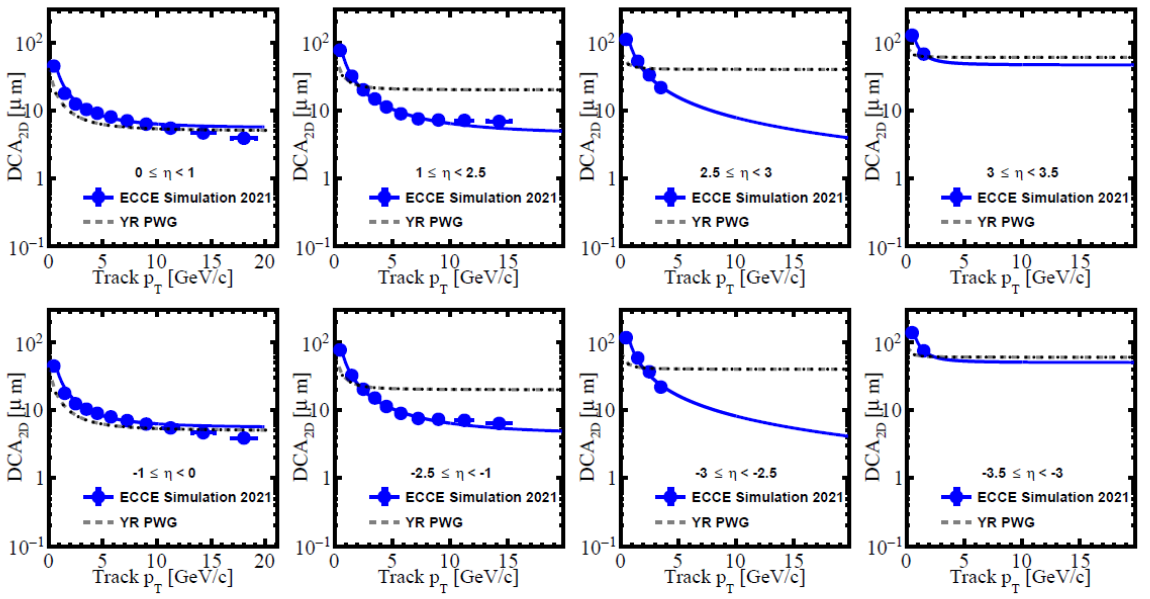


Figure 9: Pion DCA$_{2D}$ resolutions (data points), which is compared to the EIC YR PWG requirement (dashed lines). The ECCE DCA resolution is consistent v
YR requirements.

- Hope to collaborate with Xin; help is available form UIC students, ETA ~ none yet.

Jets&HF planning for TDR

- Physics benchmarks with jets, TBD:

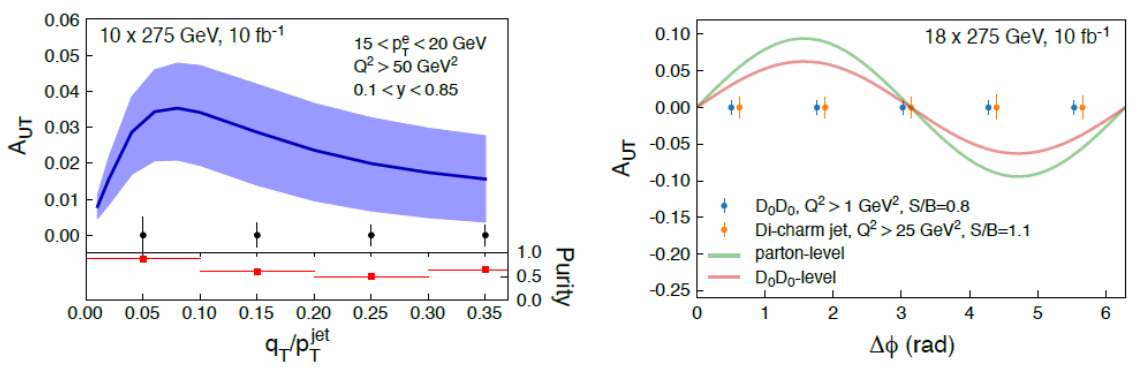


Figure 34: Left: Sensitivity for lepton-jet Sivers asymmetry (FastSim). Right: Sensitivity for di-charm Sivers asymmetry. These are representative examples of measurements probing (sea) quark TMDs and gluon TMDs, respectively (FastSim).

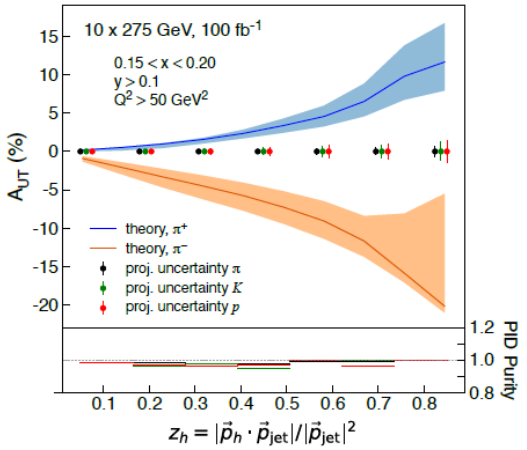


Figure 35: Projection for hadron-in-jet Collins asymmetry measurement for charged pions, kaons and protons. This is representative of the class of jet substructure measurements (FastSim).

- Sivers asymmetry (left) – Brian; Colins asymmetry (right) – Kevin; (ETA ~ mid-February)
- Other possible/additional options: angularity, jet charge

Jets&HF planning for TDR

- Physics benchmarks with HF, most problematic: can't do in full sim yet

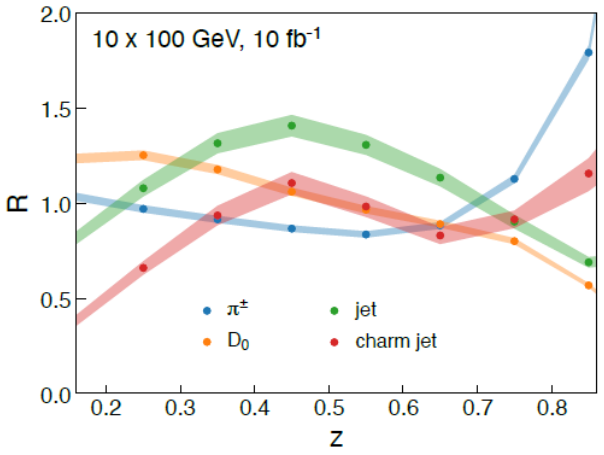


Figure 48: The double ratio R of $\pi^{\pm}$, D^0, inclusive jet (R_{jet} = 1.0), and charm-tagged jet (R_{jet} = 1.0) production per scattered electron in e+A collisions to the corresponding rate in e+p collisions, evaluated using the BeAGLE event generator for e+A collisions. The band shows the dominant source of systematic uncertainty, as described in the text. Statistical uncertainties are smaller than the symbol size (FastSim).

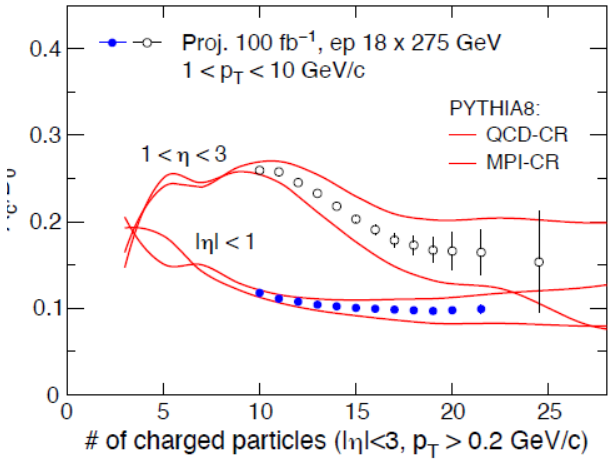


Figure 49: Projections for ATHENA measurements of the heavy-quark Λ_c^+ to D^0 baryon-to-meson ratio as a function of the charged track multiplicity (FastSim).

- No ETA