

Jets/HF/EW/BSM Working Group Update



ATHENA

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ATHENA Bi-weekly Meeting

August 19th, 2021

Simulation and Analysis Readiness

- ❑ Test samples (1M events per setting) of NC DIS using Pythia-8 with all beam effects included have been generated – can be used by other groups as well
 - Energy Bins: 18x275, 10x275, 10x100, 5x100, 5x41
 - Q^2 Bins: $Q^2 > 1$, $Q^2 > 10$, $Q^2 > 100$, $Q^2 > 1000$ GeV²

- ❑ CC DIS sample has also been generated and am in the process of validating Photoproduction sample

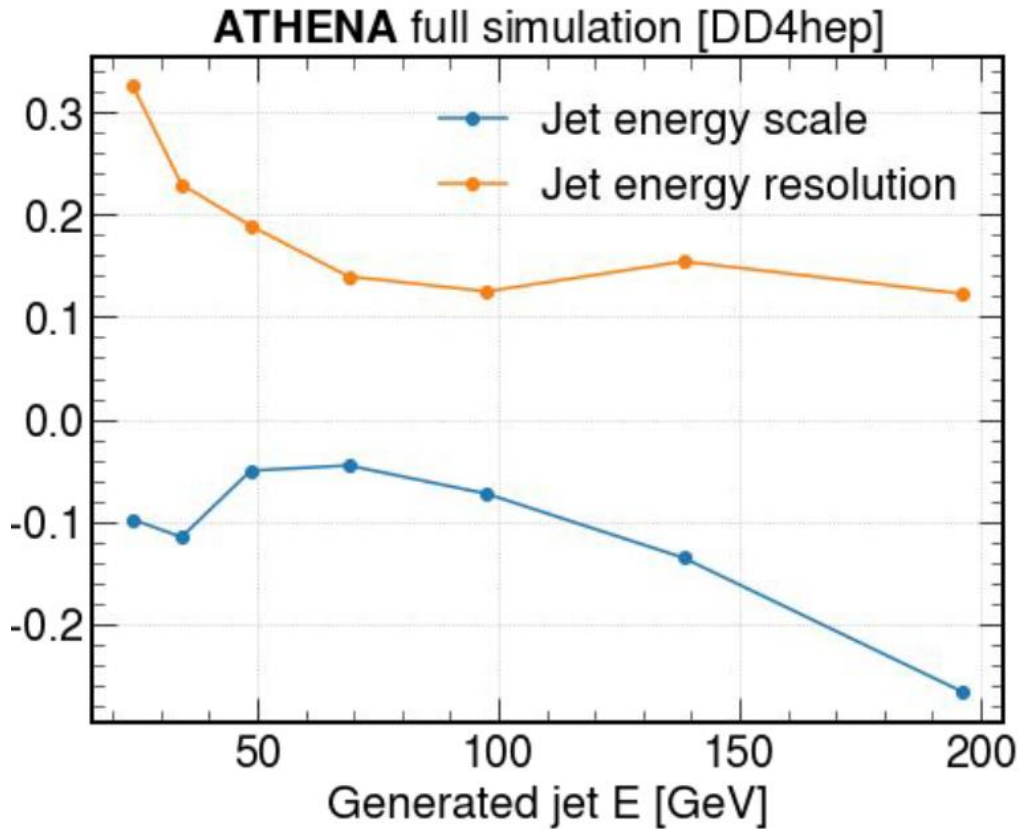
- ❑ Some questions regarding choice of PDFs and shower models – these are likely refinements and shouldn't hold up production

- ❑ Multiple people have begun looking at basic quantities in the full simulation (single particle) – single calorimeter quantities look reasonable

- ❑ Moving to jet analyses will require combining information from several subsystems
 - Algorithm to combine clusters from imaging and ScFi sections of ECal
 - Algorithm to combine ECal and HCal clusters
 - Algorithm to match tracks to clusters and avoid double counting
 - PID?
 - Vertexing?

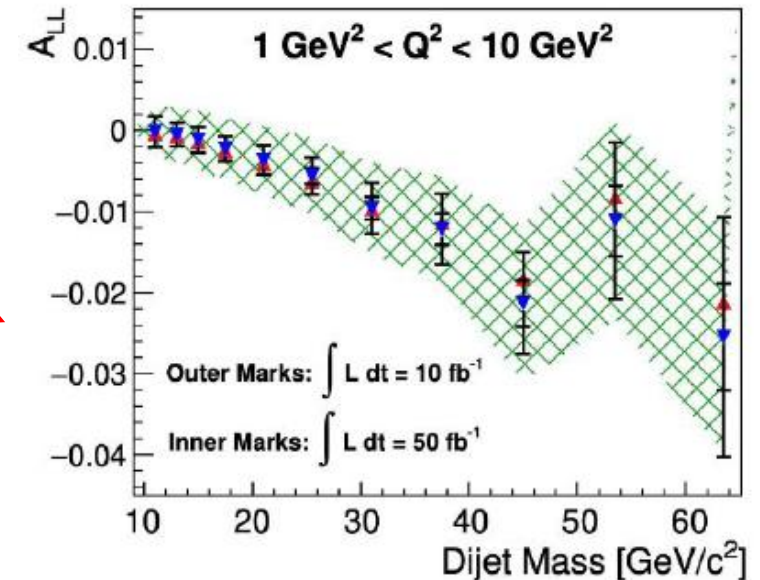
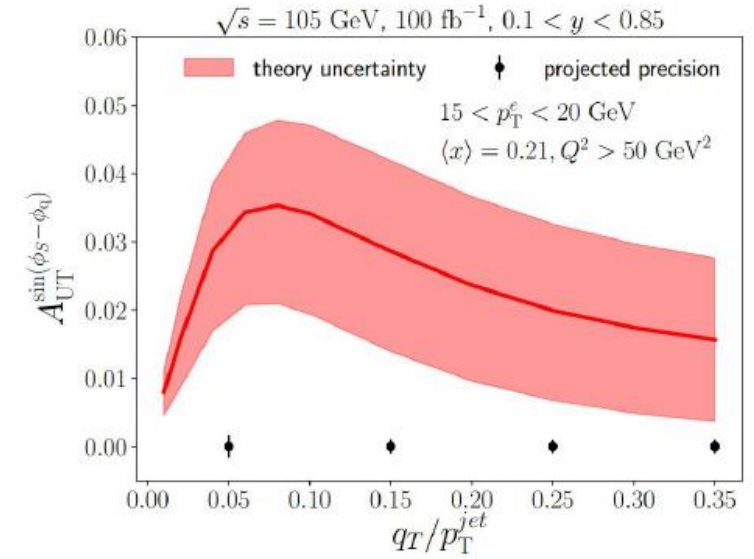
Potential Plots and Related Physics

“Low-Level” Quantity



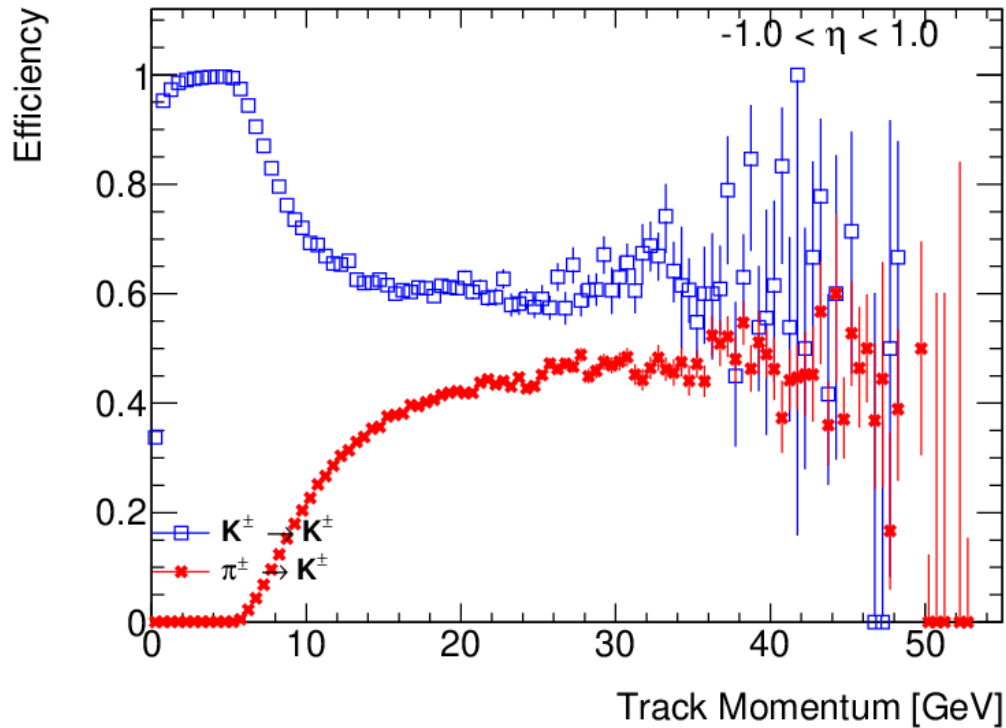
Basic quantities such as JES and JER will impact basically all jet measurements

Physics Quantities



Potential Plots and Related Physics

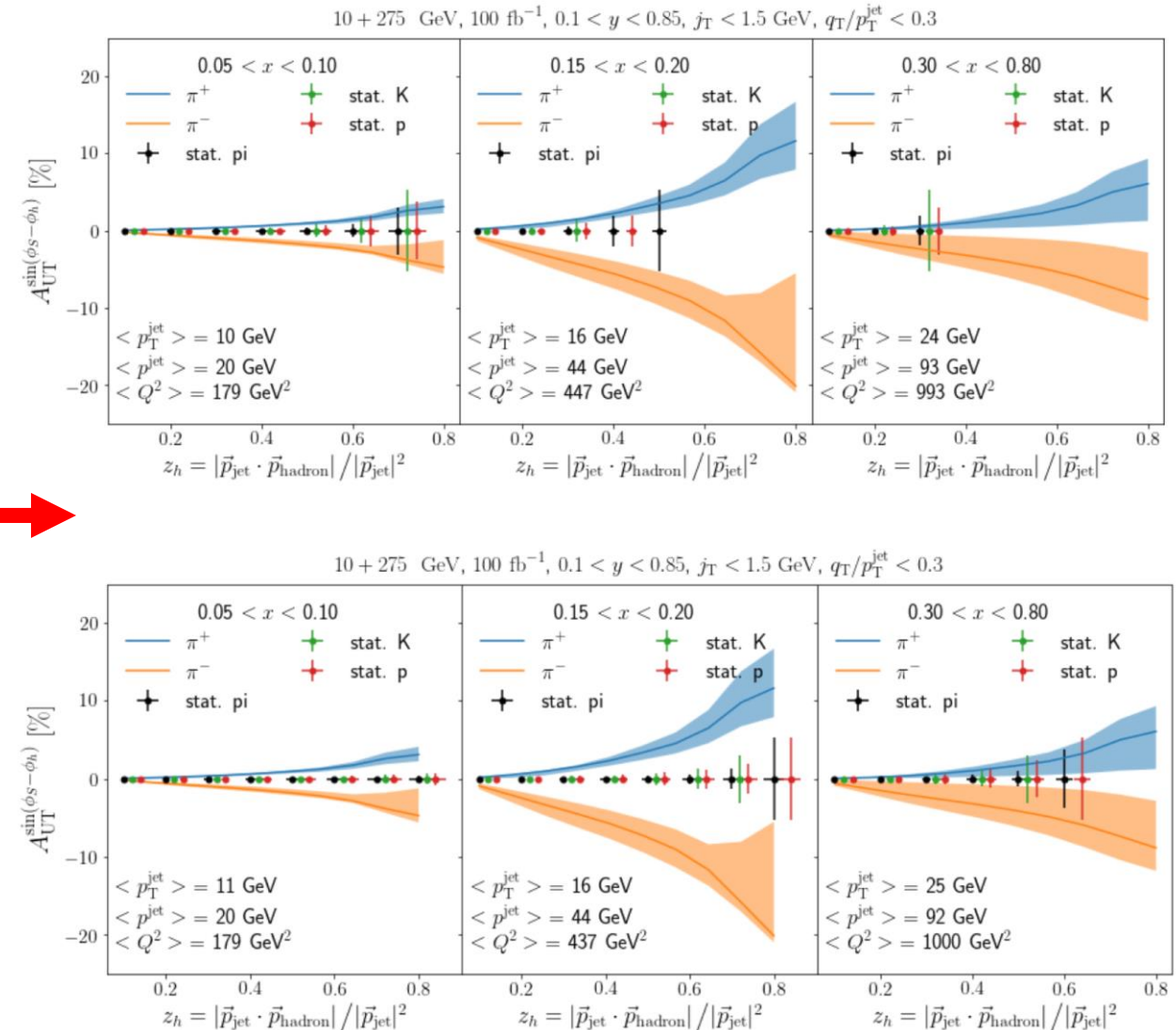
“Low-Level” Quantities



❑ PID capability will enable a range of fragmentation measurements and may aid in H.F.S. reconstruction

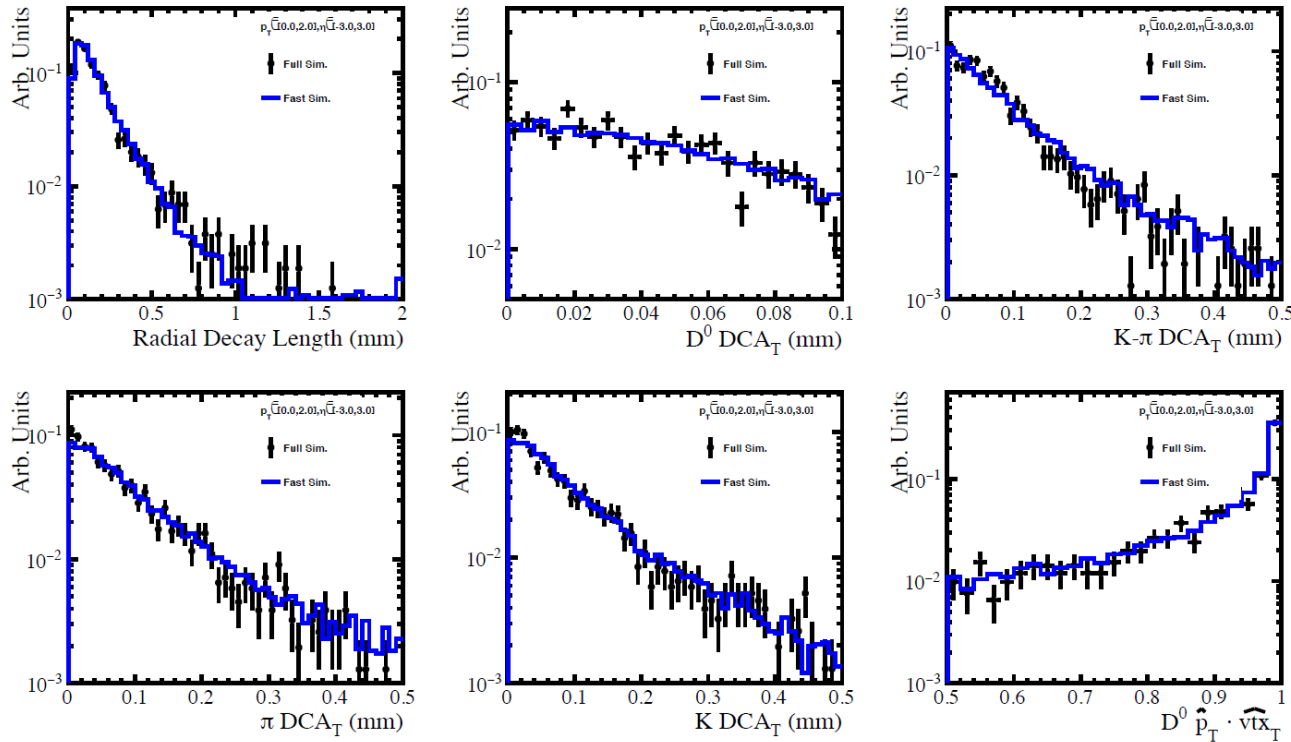
❑ High PID reach in barrel will open up previously unexplored phasespace – likely unique to ATHENA

Physics Quantities



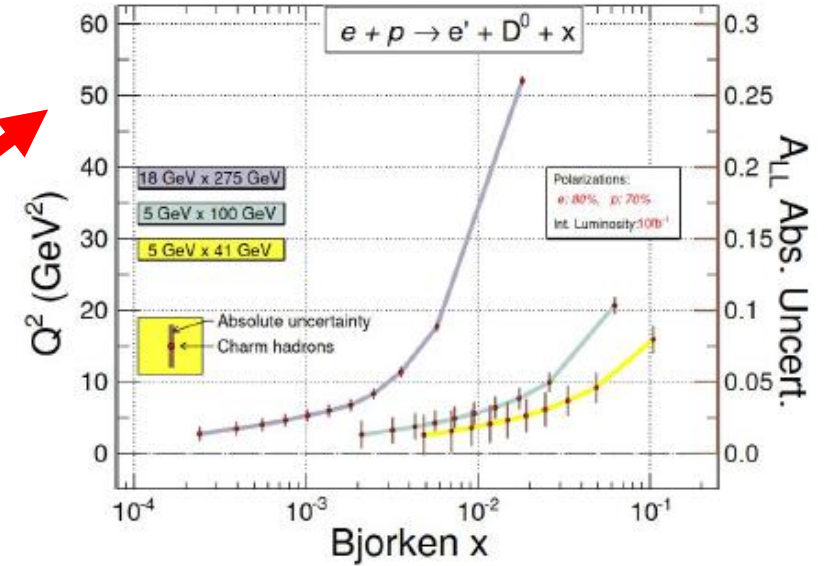
Potential Plots and Related Physics

“Low-Level” Quantities

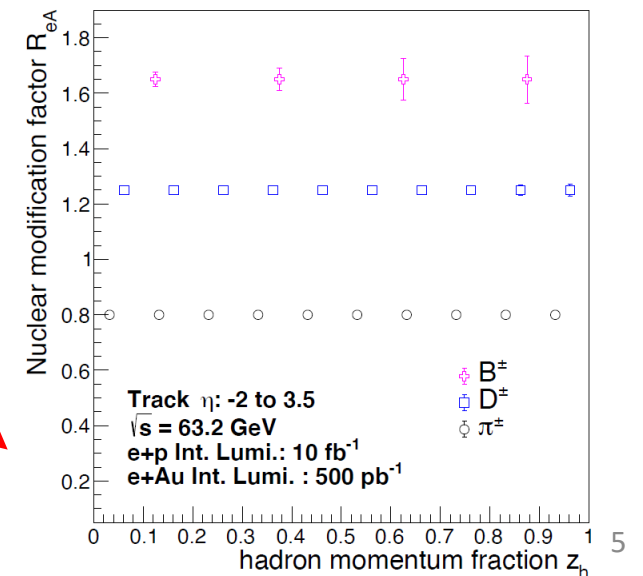


- Excellent vertexing capabilities will be essential for the Heavy Flavor program
- Direct reconstruction of Charm / Bottom quarks for a host of applications as well as assisting in Charm jet tagging

Physics Quantities



Projected hadron R_{eA} vs z_h



Potential Plots and Related Physics

- ❑ Reconstruction of the hadronic final state underpins all measurements we want to make
- ❑ This is a placeholder plot showing comparison between H1 full GEANT simulation and DELPHES – validation of fast simu

