Los Alamos
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Draft Plots from HF & jets Working Group

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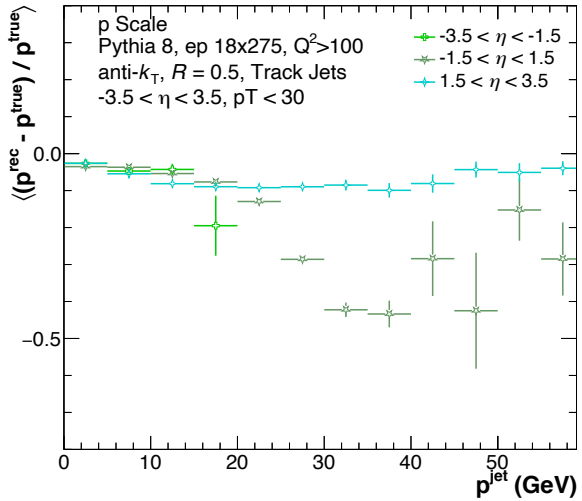
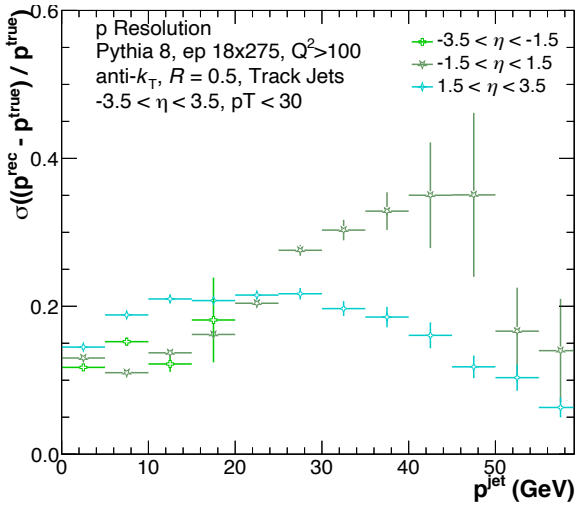
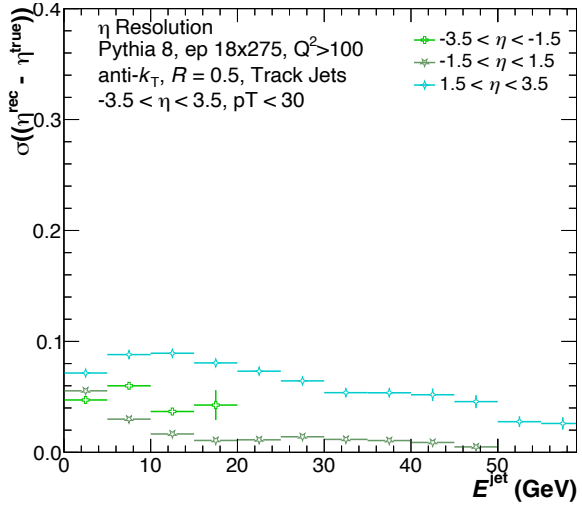
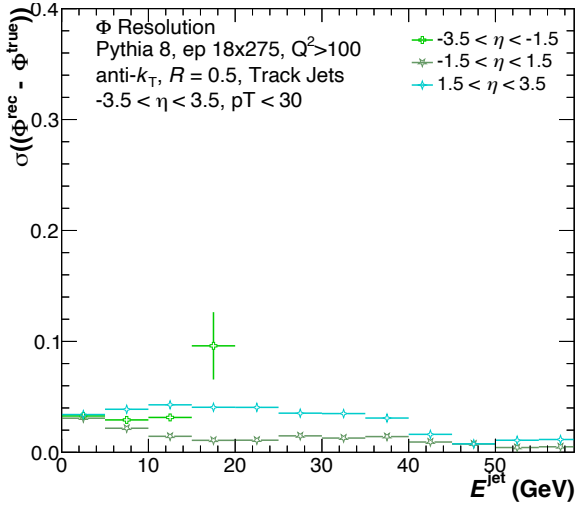
Performance of Track Jet Reconstruction





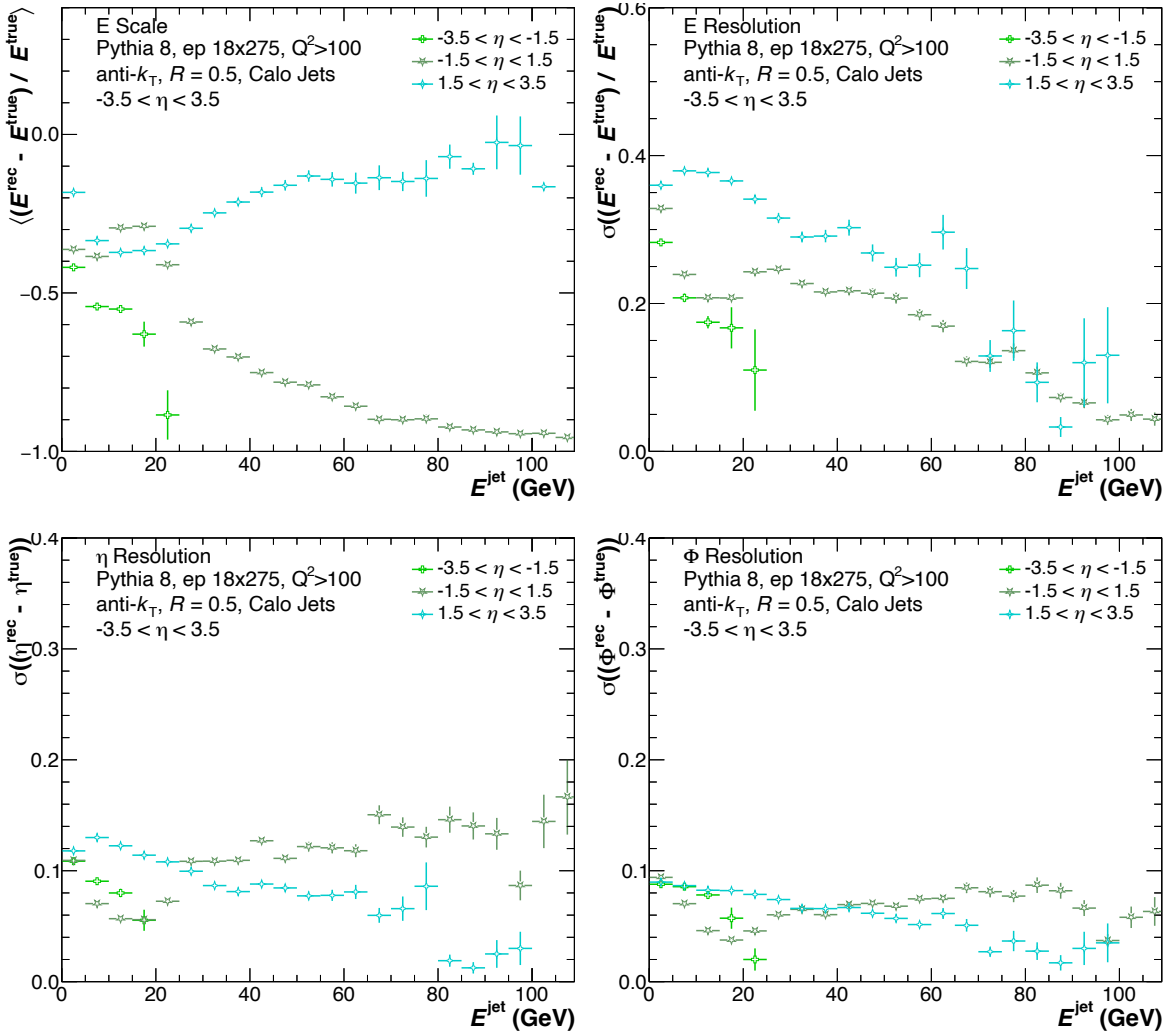




- July concept, Pythia 8
- 18x275 GeV ep collisions
- Q^2>100 GeV^2
- Jet R=0.5
- $|\eta| < 3.5$
- p_T<30 GeV

- Momentum scale and momentum resolution of track jets gets worse at higher p_{jet} (p_{jet}>20 GeV)
- η and ϕ resolutions are under 10% and 5%, respectively

Performance of Calorimeter Jet Reconstruction

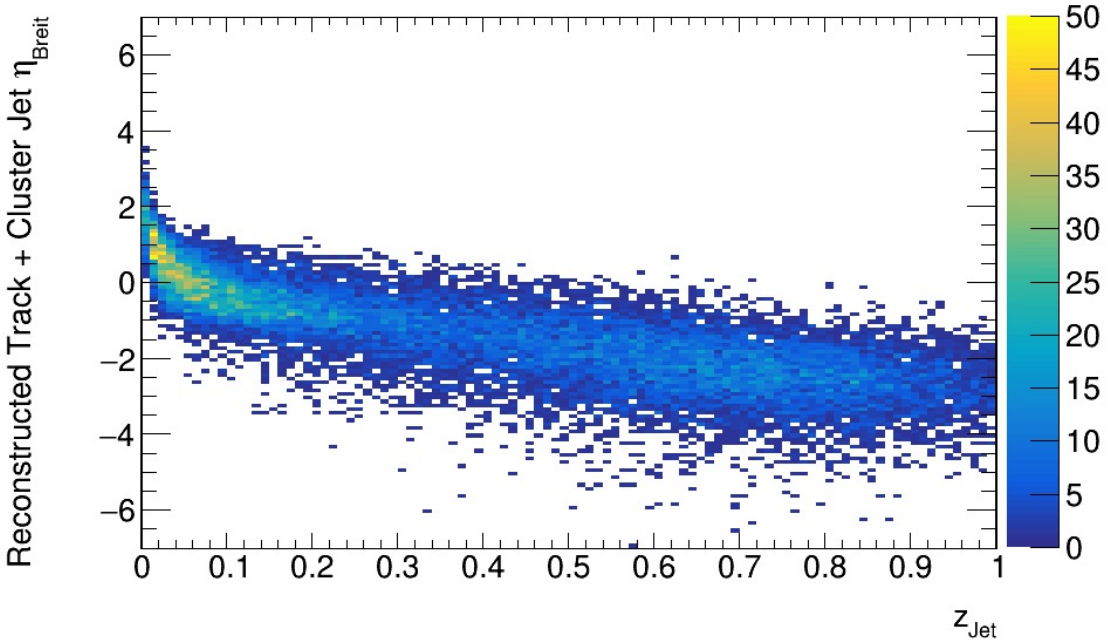


- July concept, Pythia 8
- 18x275 GeV ep collisions
- Q^2>100 GeV^2
- Jet R=0.5
- $|\eta| < 3.5$

- Jet energy scale of the calorimeter jets gets worse at higher E_{jet} (E_{jet}>20 GeV)
- η and ϕ resolution are under 20% and 10%, respectively

Next: understand the causes of the worsening JES and jet momentum reconstruction

Jet finding using Centauro Algorithm: η_{jet} vs z_{jet}



Pythia6 events from SIDIS WG
10x100 ep
July concept, 20k events, R=0.8

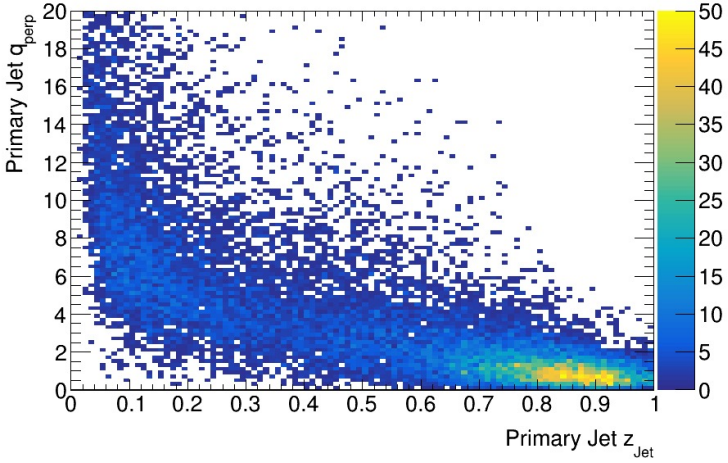
- Add in neutral clusters – isolated clusters without a track within 0.1 in $\Delta\eta$, $\Delta\phi$ space
- Smearing in z_{jet} in simulation results:
  - ECCE lab frame includes crossing angle, but the Centauro paper consider head on collisions
  - Missing energy → lower the z_{jet}
  - Different event generators

q_{Prep} vs z_{jet} and Jet Charge

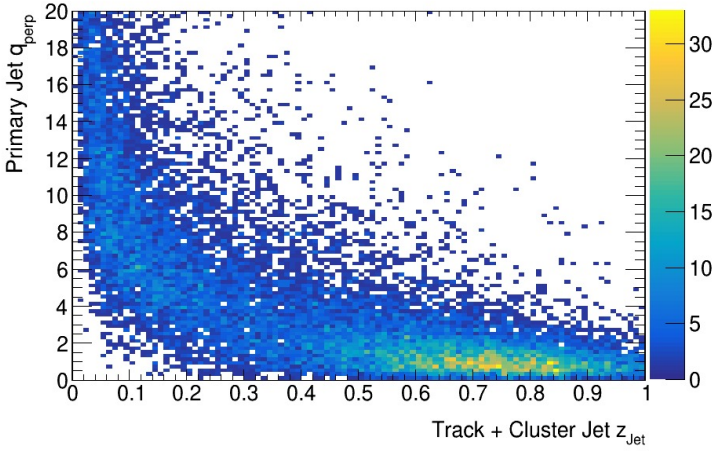
Using Centauro Algorithm

July concept (Pythia 6)

True



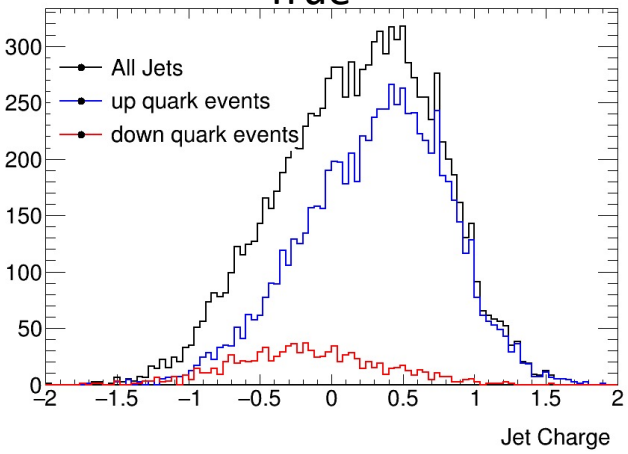
Reconstructed



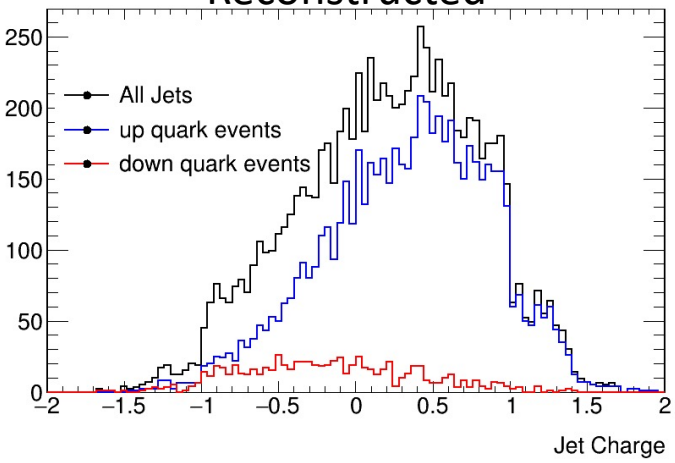
$$q_{prep} = p_{jet}^{\perp}/z_{jet}$$

q_{prep} in $0.5 < z_{jet} < 1$: this is the transverse momentum of the jet with respect to the scattered quark direction

True



Reconstructed

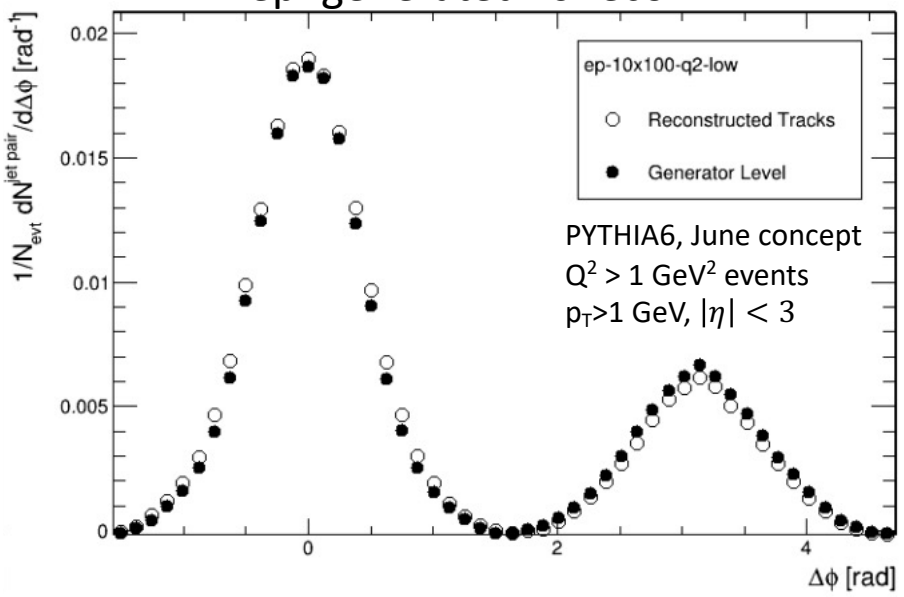


$$Q_{jet} = \frac{1}{\sqrt{p_T^{Jet}}} \sum_i q_i p_i^{0.5}$$

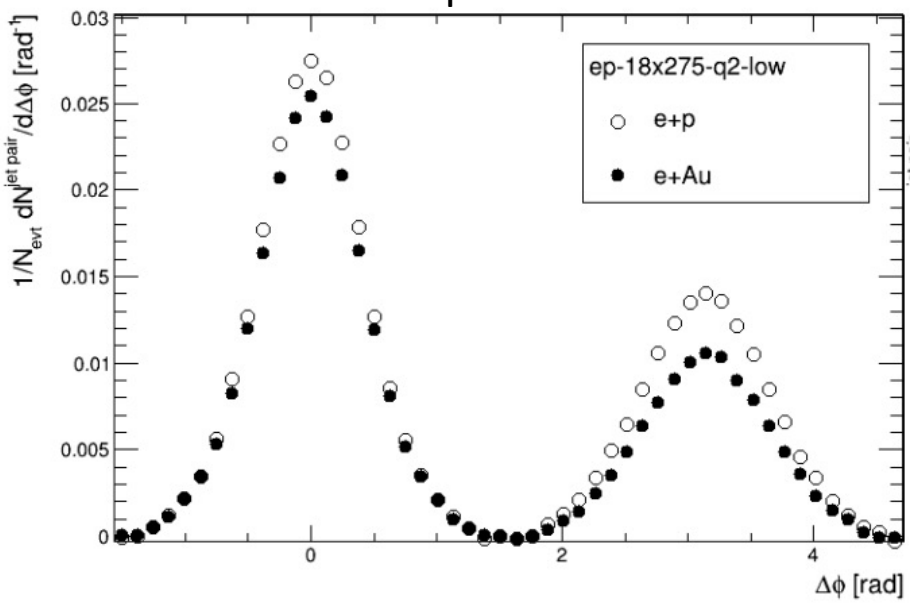
Possible to isolate statistically enriched samples of u,d quarks jets

Two-Particle Correlations

ep: generated vs reco



ep vs eA



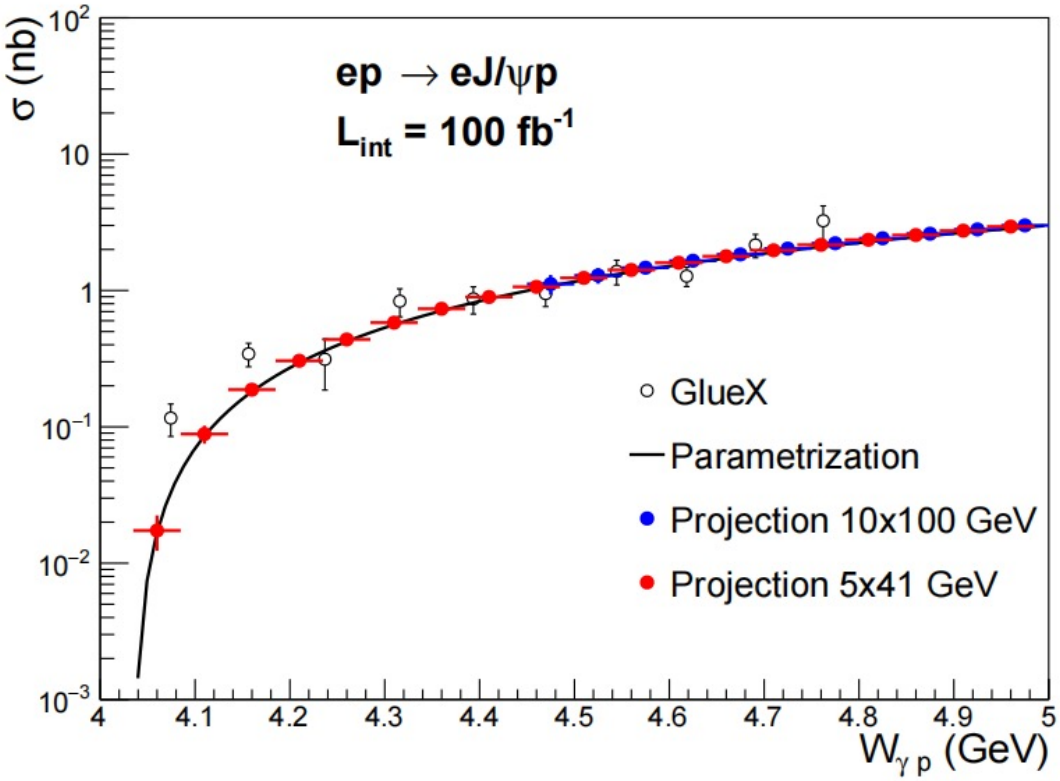
- Tracks are boosted for the beam crossing angle
- Use EPS09 weighting to calculate the nPDF weight for eAu For each event:
  - x_{Bj} is saved in the EventEvaluator ntuples
  - Identify the scattered electron to calculate Q^2
  - Identify the struck parton as the first parton in the PYTHIA event record
  - Apply the event weight at fill-time to e+Au histograms
- Next: produce the same set of plots for 2nd simulation production

EPS09 weighting will be applied in jet R_{eA} study as well

https://indico.bnl.gov/event/13133/contributions/55463/attachments/37471/61757/Grau_nPDFWeighting_20211001.pdf

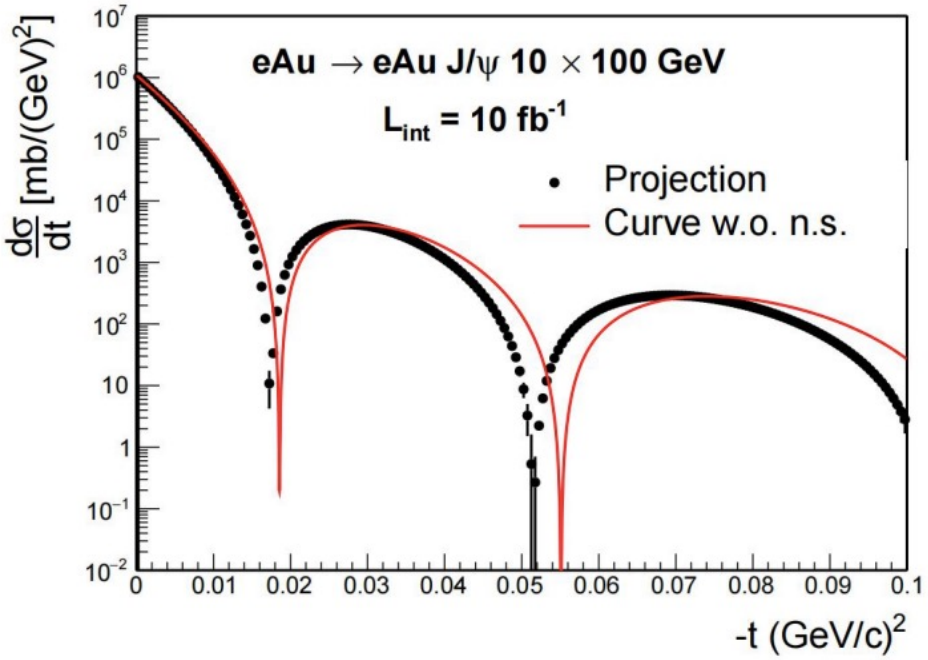
J/ψ Production Threshold

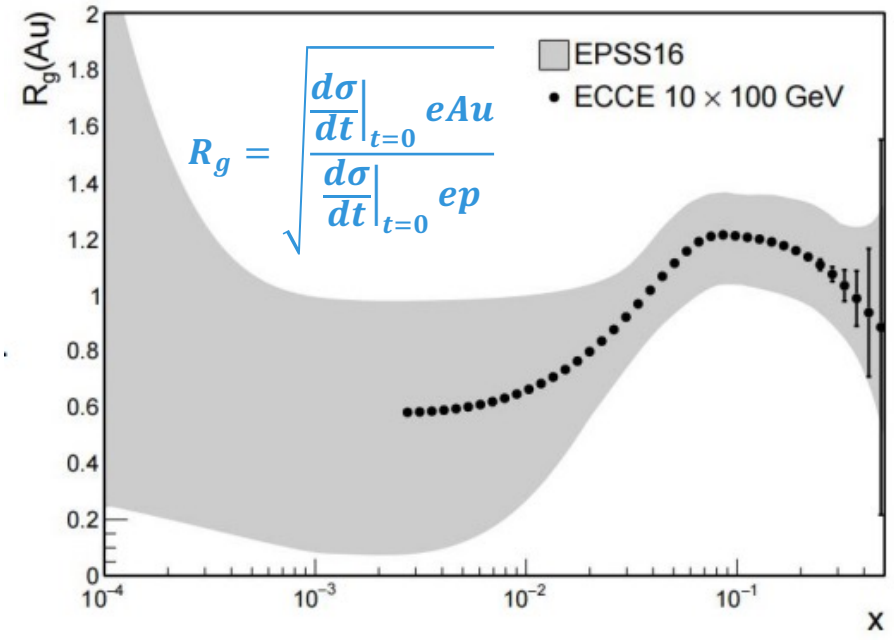
The momentum fraction z is not well defined
-->Drop the $R_{eA}(z)$ but added three new plots



- Use detector performance of the June concept as input
- Working on July concept data – eID problem

Gluon Study via J/ψ Reconstructions





- Using detector performance from the June concept as input along with crossection and luminosity from the simulation
- Reflect gluon position distribution (n.s.: neutron skin)

- Gluon distribution ratio: eAu/ep
- Gloun shadowing at small x