r_c with BeAGLE

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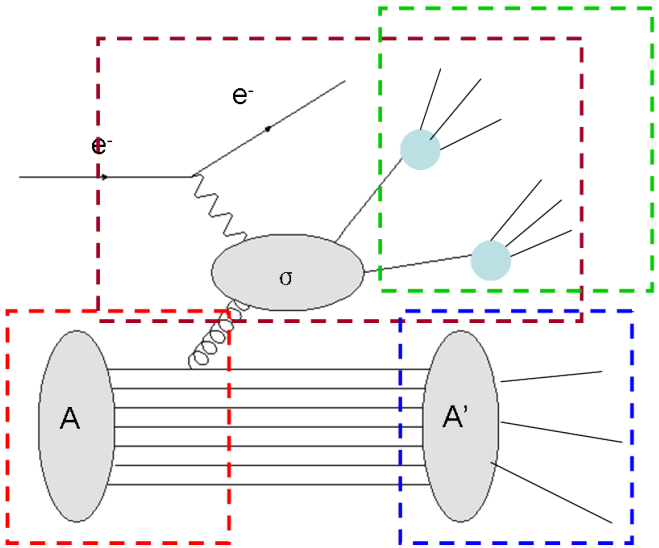
Correlation of Leading Hadrons in Jet

$$r_c = \frac{Y_{cc} - Y_{c\bar{c}}}{Y_{cc} + Y_{c\bar{c}}}$$

Where c is the charged final hadron ($\pi^{\pm}, K^{\pm}$ and $p/\bar{p}$)

Simulation With BeAGLE



A hybrid model consisting of DPMJet and PYTHIA with nPDF EPS09.

Nuclear geometry by DPMJet and nPDF provided by EPS09.

Parton level interaction and jet fragmentation completed in PYTHIA.

Nuclear evaporation (gamma dexcitation/nuclear fission/fermi break up) treated by DPMJet

Energy loss effect from routine by Salgado&Wiedemann to simulate the nuclear fragmentation effect in cold nuclear matter

- BeAGLE on ifarm:

  /cvmfs/eic.opensciencegrid.org/x8664_sl7/MCEG/releases/env/dev/PACKAGES/BeAGLE

- e-Au simulation with energy of $18\ GeV$ and $110 \times 197 = 21.67\ TeV$
- cuts: $Q^2 : 60 - 20000\ GeV^2$; $y : 0.1 - 0.6$; $\theta : 0 - 6.29(2\pi)$
- particle selection: $|\eta| < 3$ && $p_T > 0.05\ GeV$
- jet selection: $p_T > 5\ GeV$

Basic Info

Nuclear Modification: Intranuclear cascade and Parton Quenching

- TAUFOR: turn on/off intranuclear cascade
- parton quenching (qhat): applies energy loss to the partons after they have been simulated by Pythia, but before they have been hadronized.

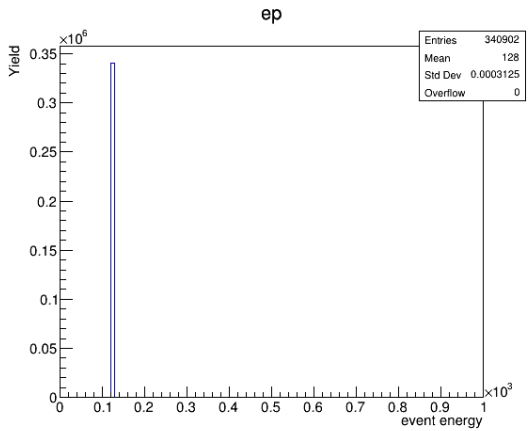
Name convention:

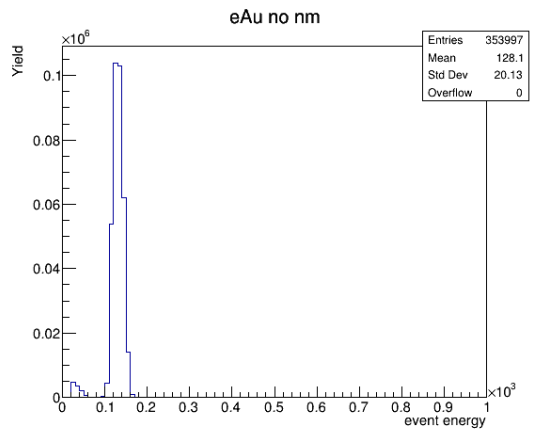
- nm: nuclear modification = nc + qhat
- nc: nuclear cascade
- qhat: qhat value for parton quenching

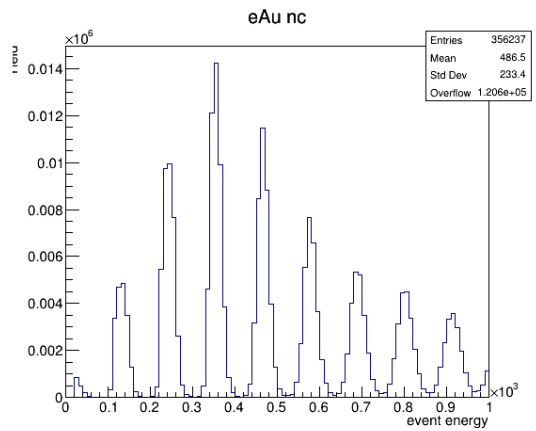
So "eAu nc" means eAu sim. with nc but no parton quenching; while "eAu qhat=1" means eAu sim. with parton quenching but no nc

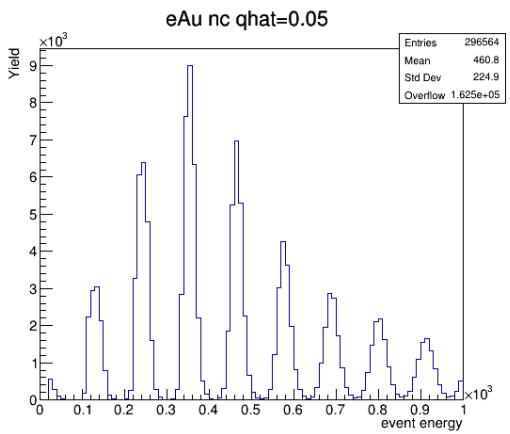
Result: Event Energy

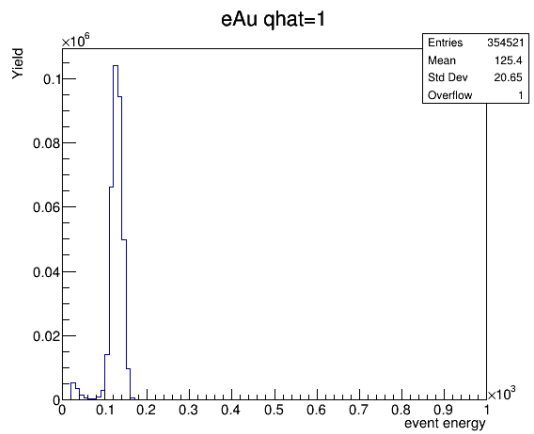
- Event energy is the total energy of all final state particles
- With nc turned on, more nucleons are involved in the interaction
- The width of the energy spectrum is too wide

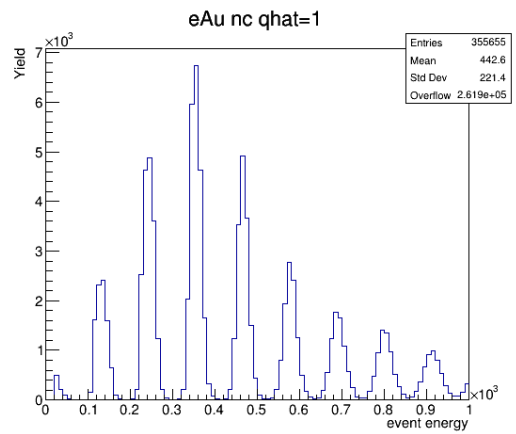






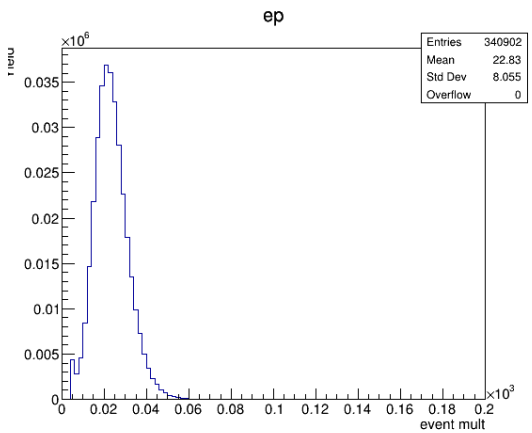


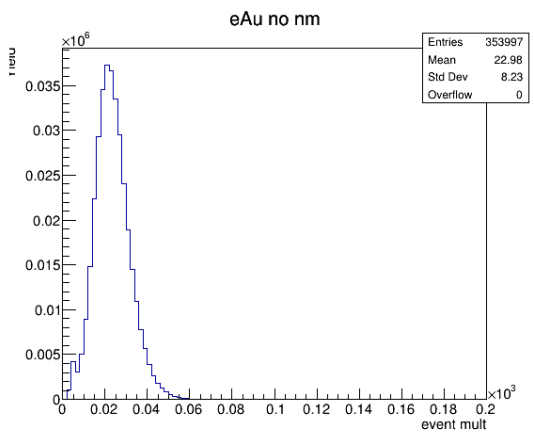


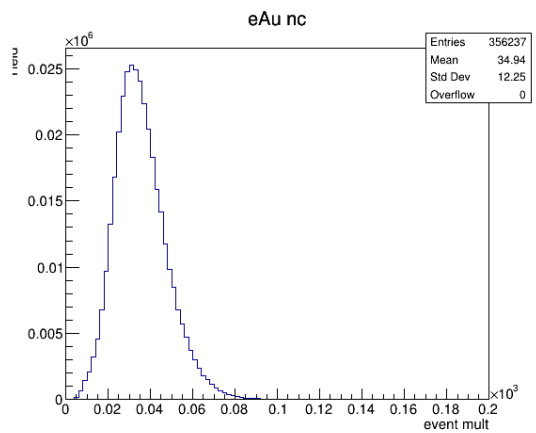


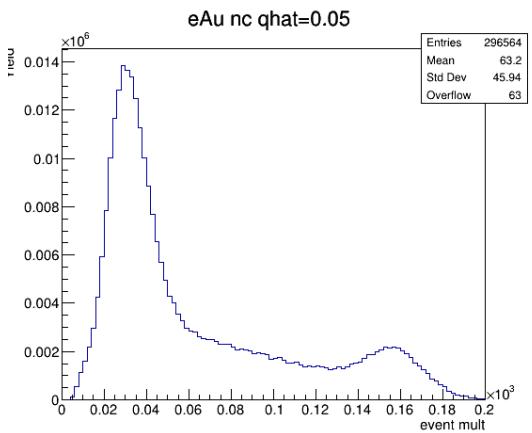
Result: Event Multiplicity

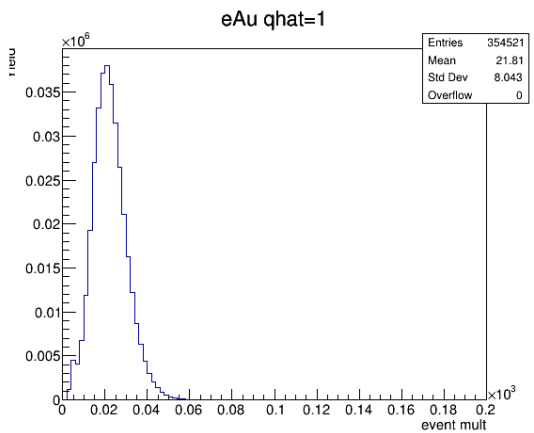
- Event Multiplicity is the number of final state particles in an event
- nc will increase event multiplicity
- With nc turned on, parton quenching will also increase event mult., the higher the qhat value, the higher the second peak in multiplicty

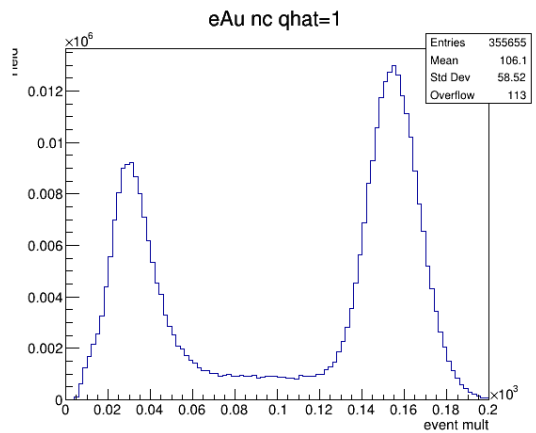




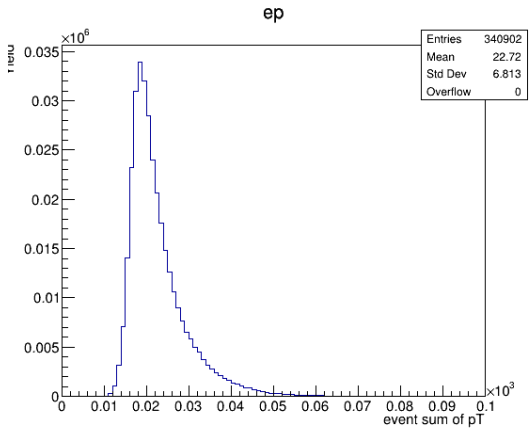


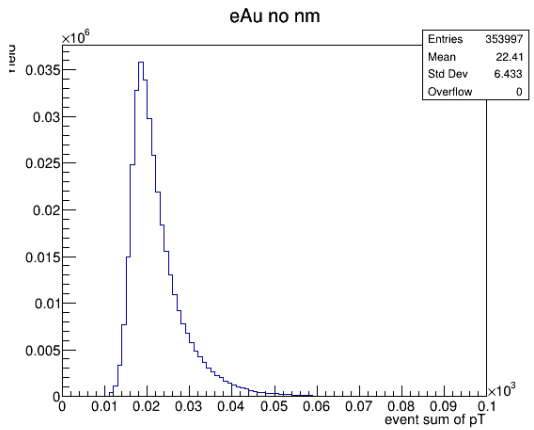


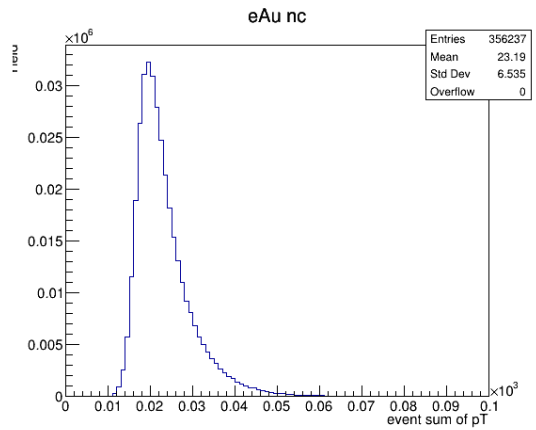


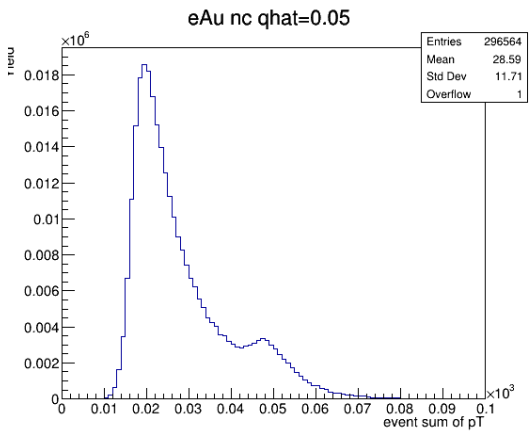


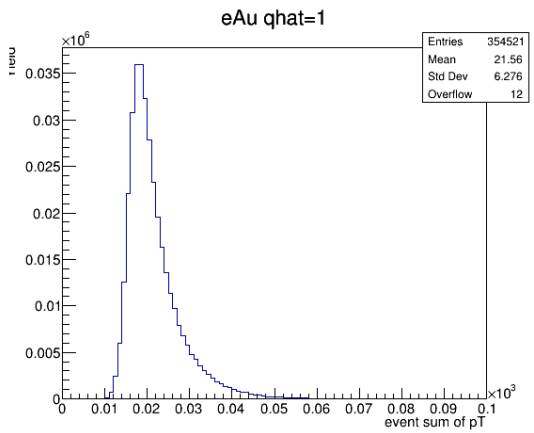
Result: Event pT

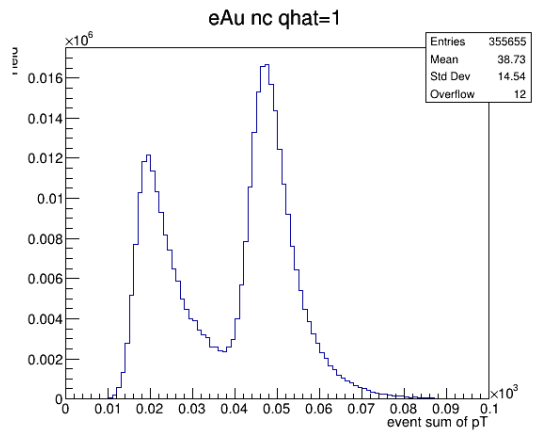




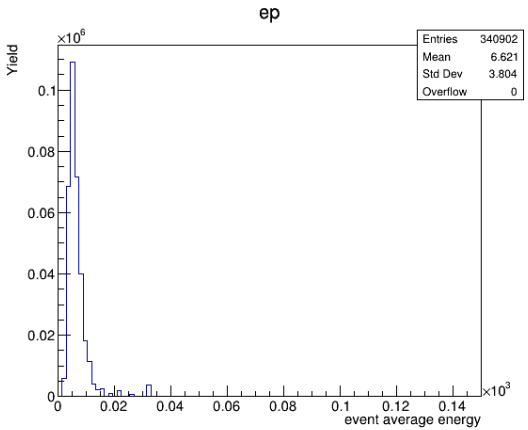


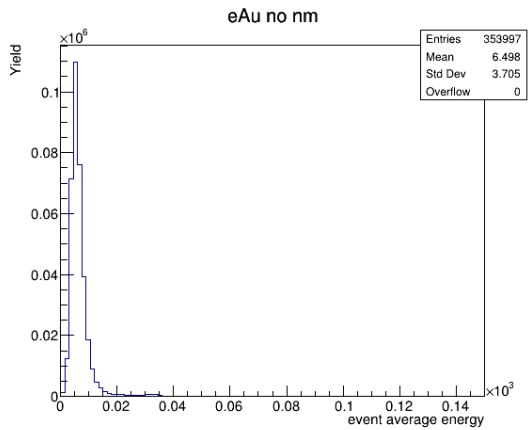


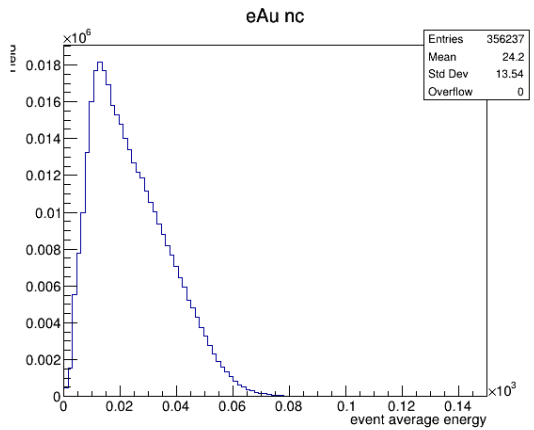


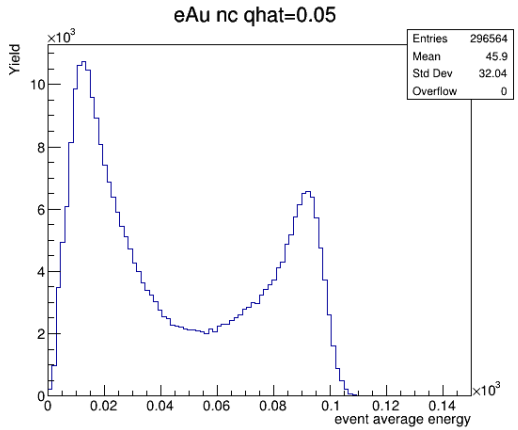


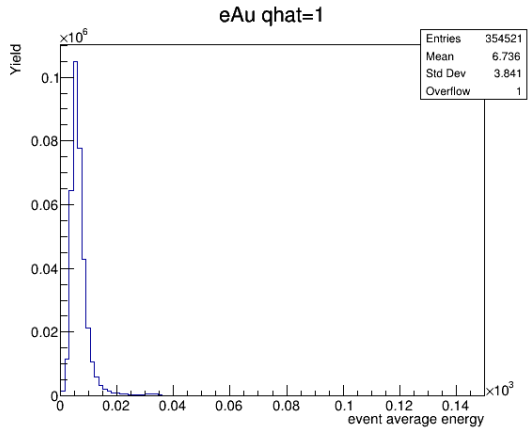
Result: Particle Average Energy

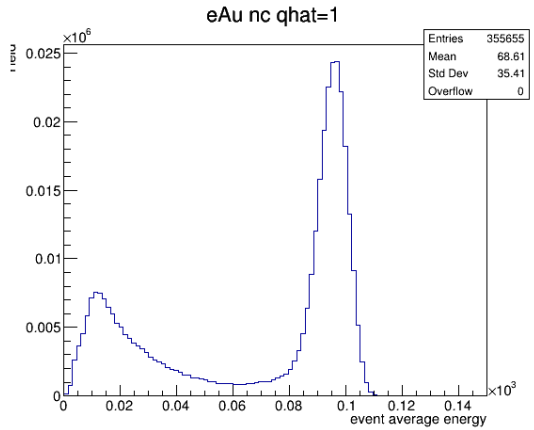












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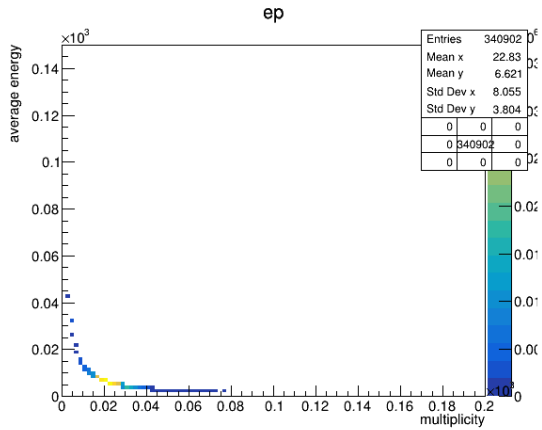
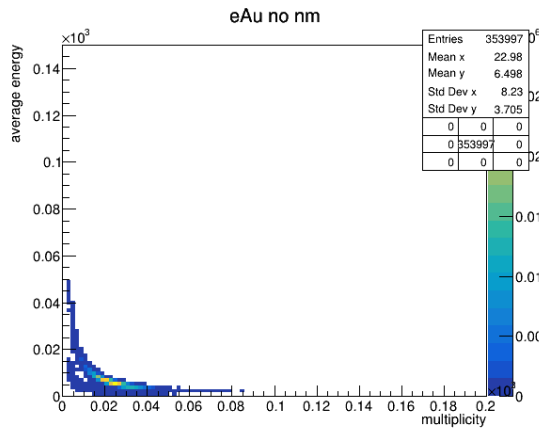
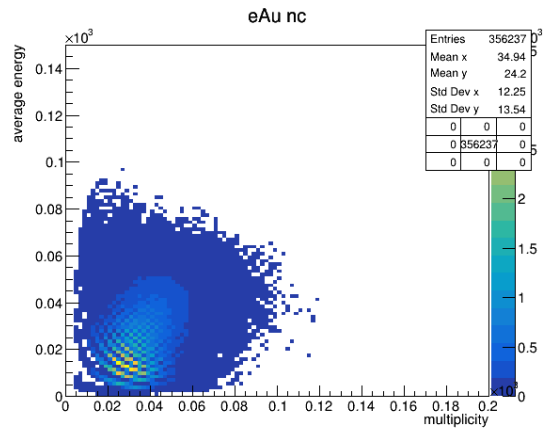
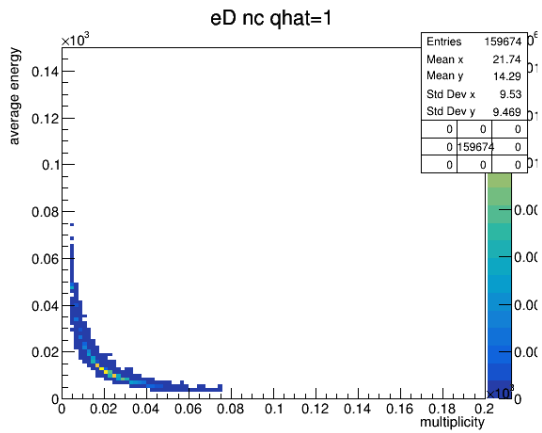
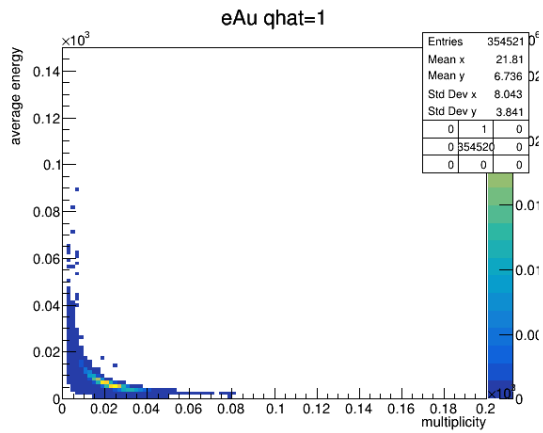
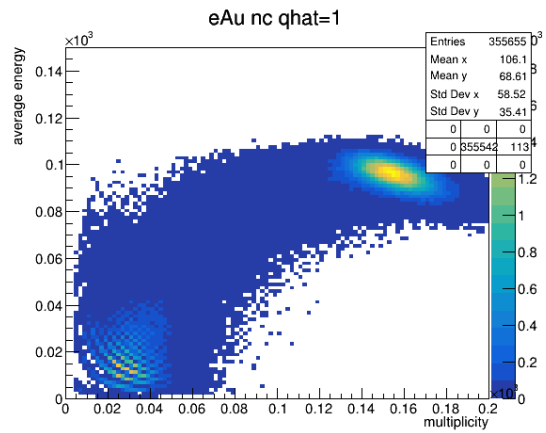




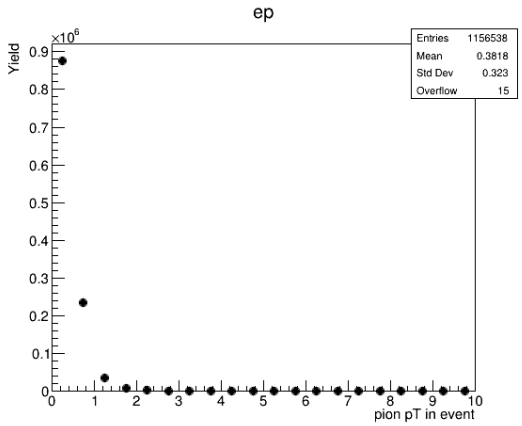


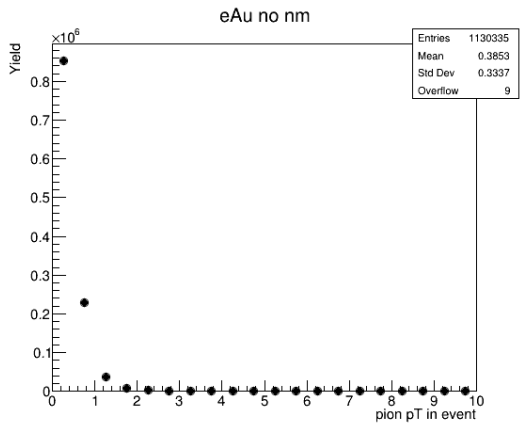


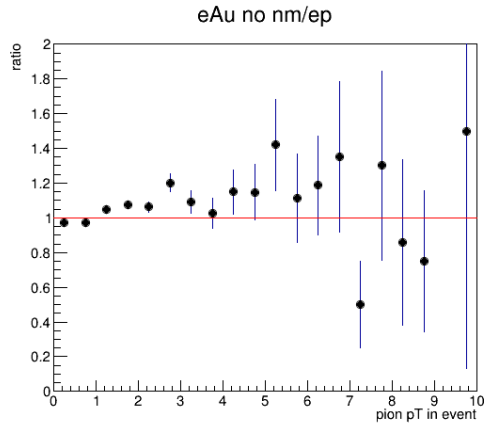


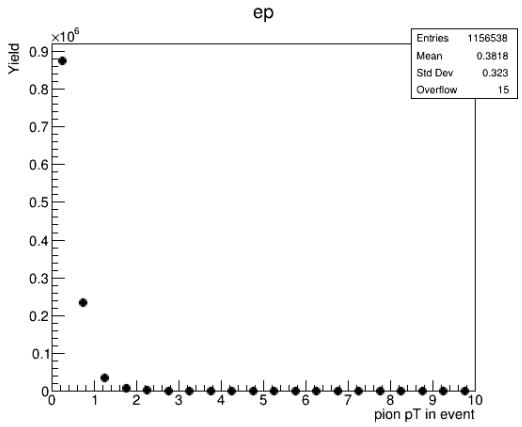


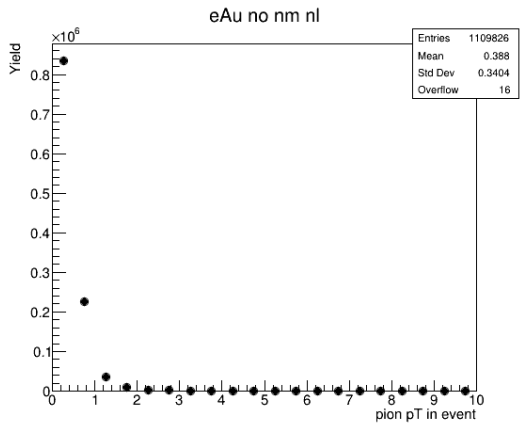
Cronin Effect ($\pi^{\pm}$)

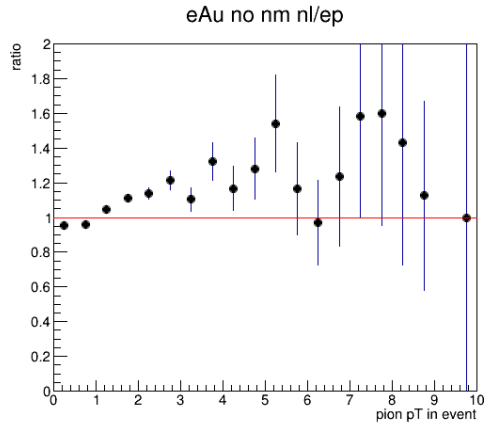


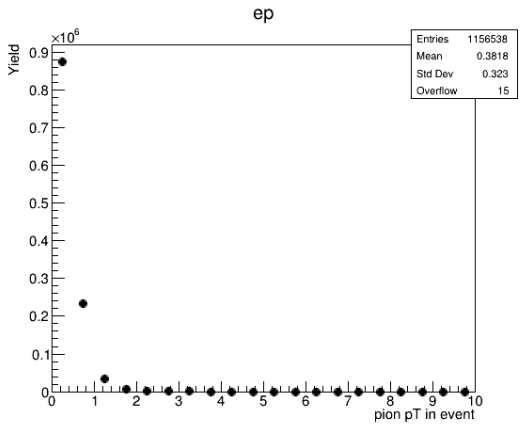


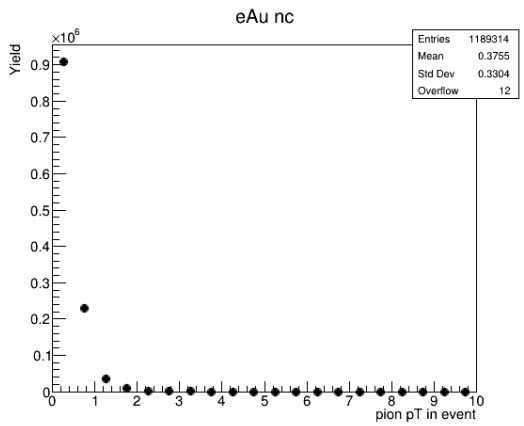


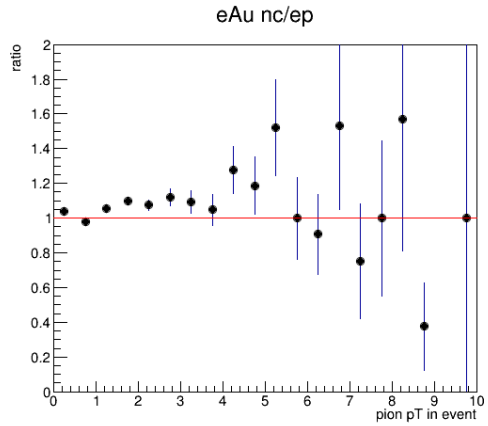




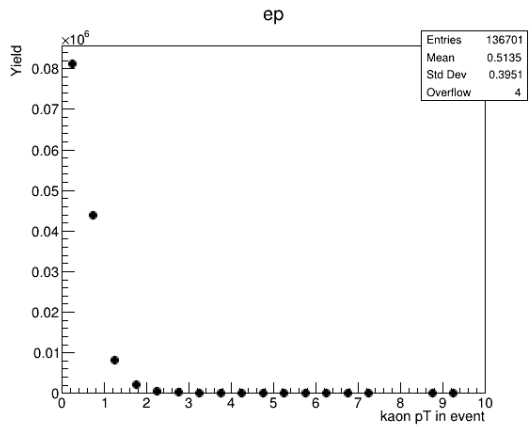


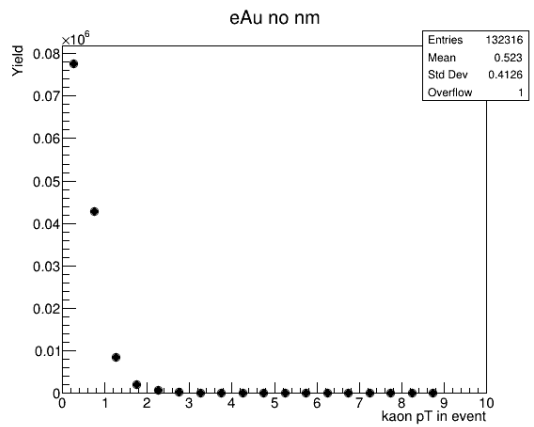


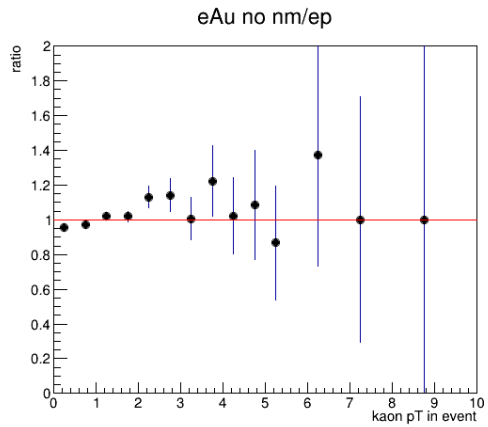


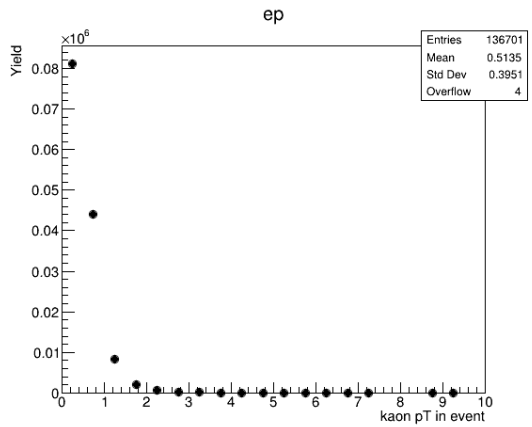


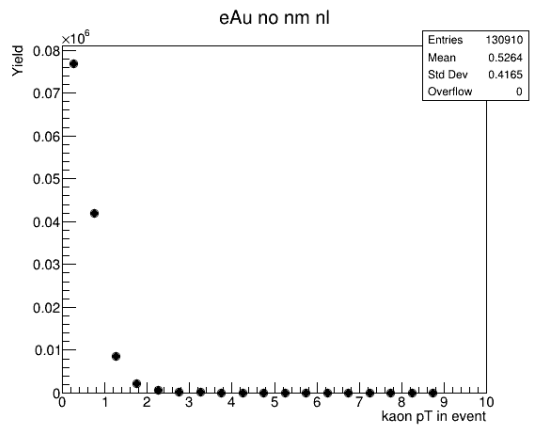
Cronin Effect $K^{\pm}$

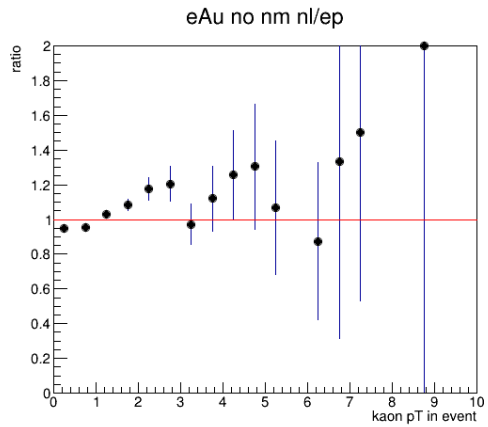


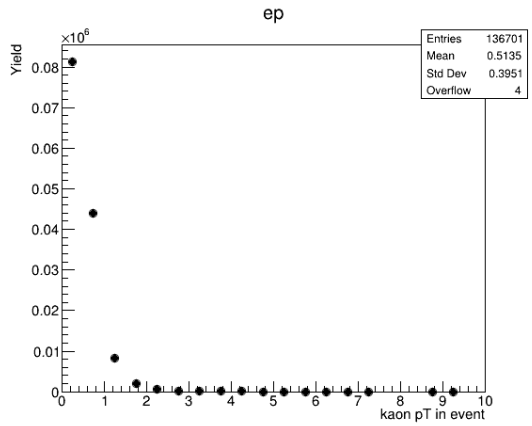


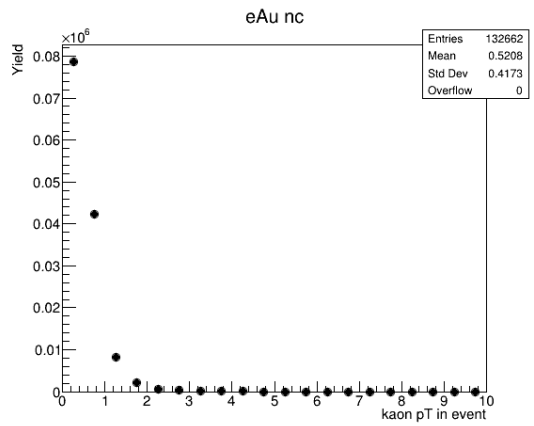


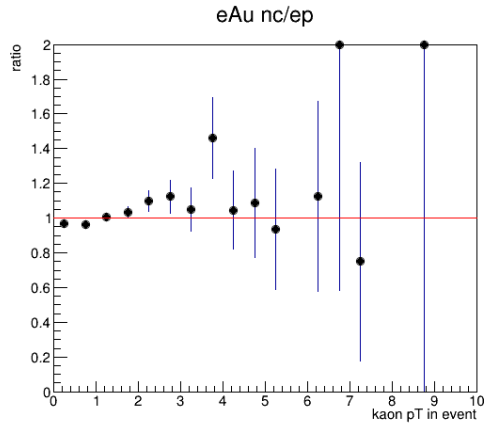




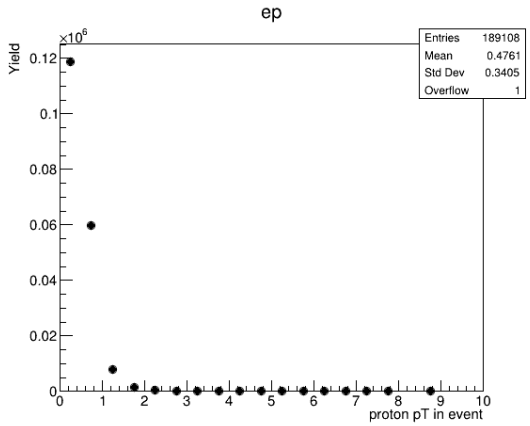


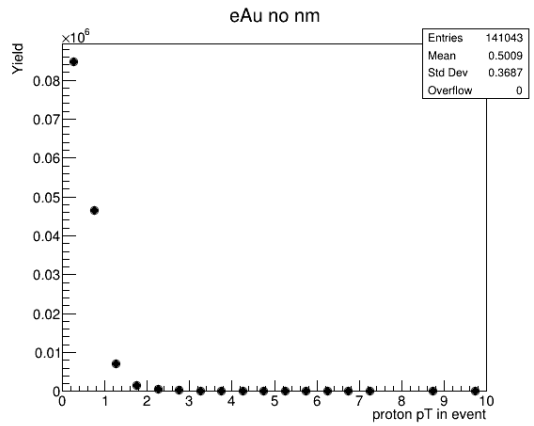


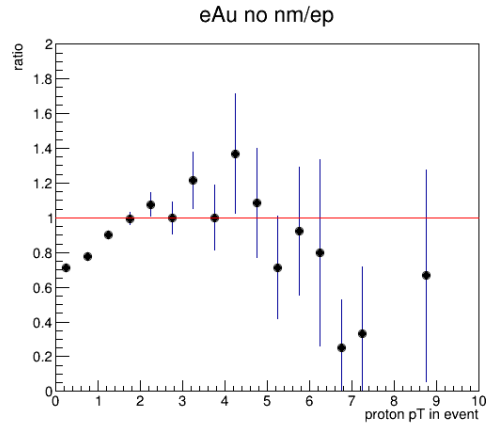


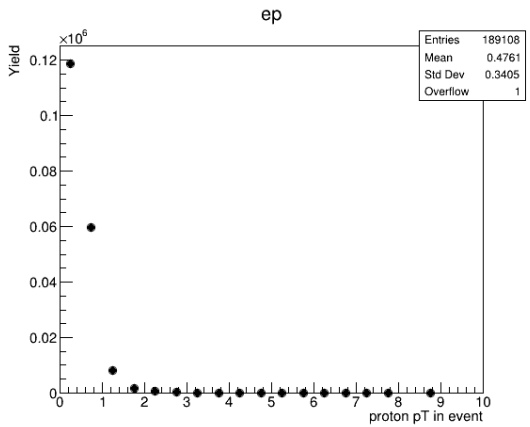


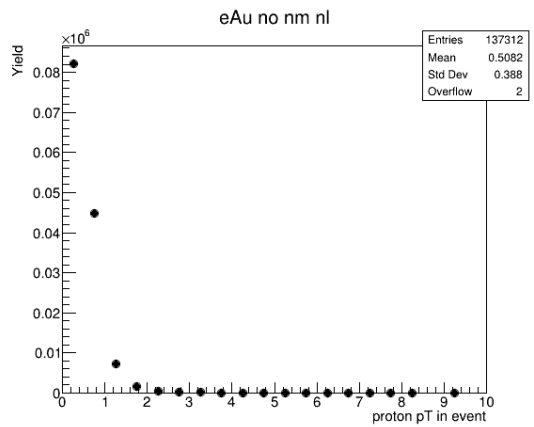
Cronin Effect $p\bar{p}$

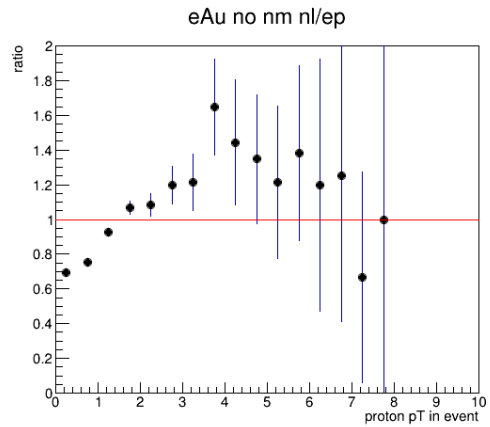


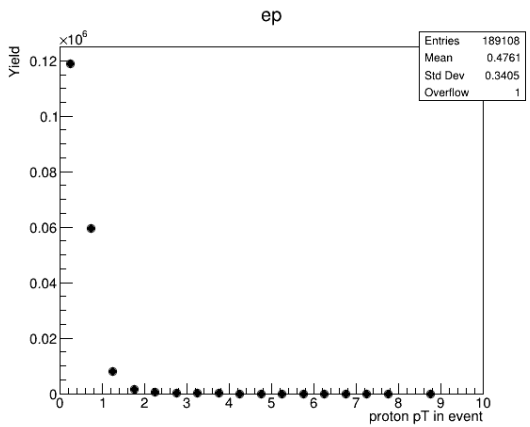


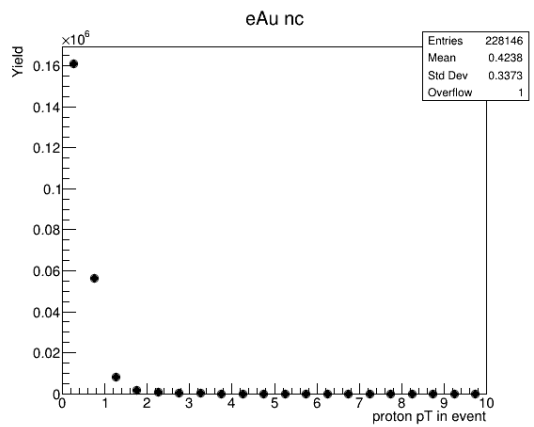


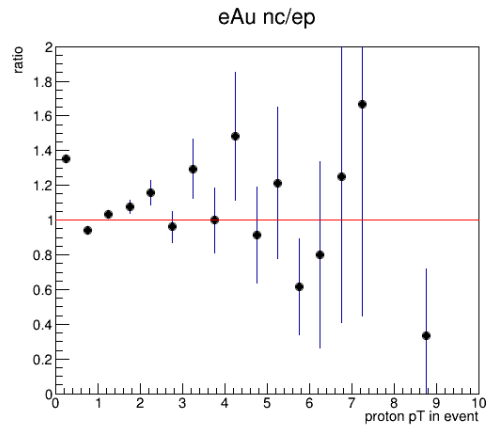




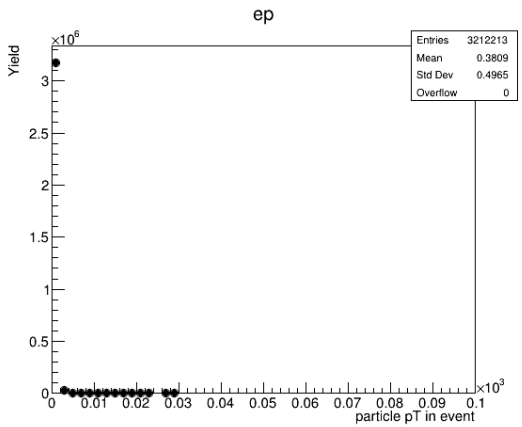


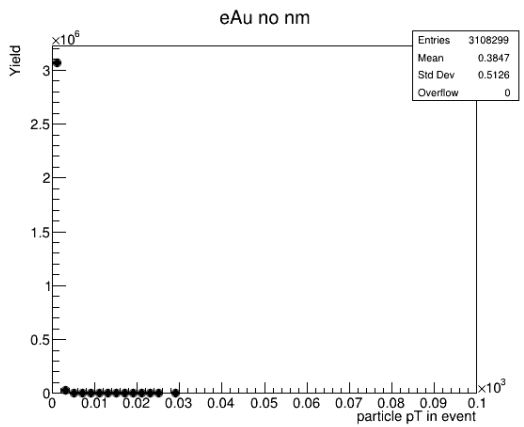


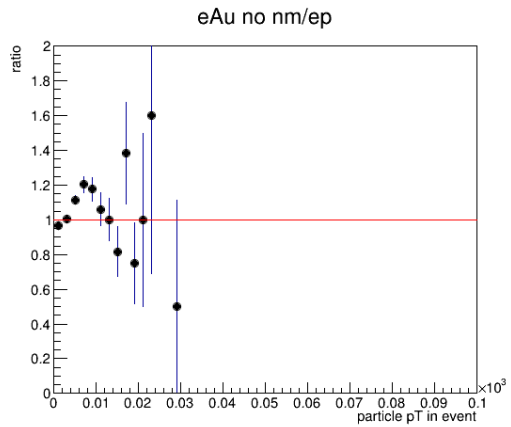


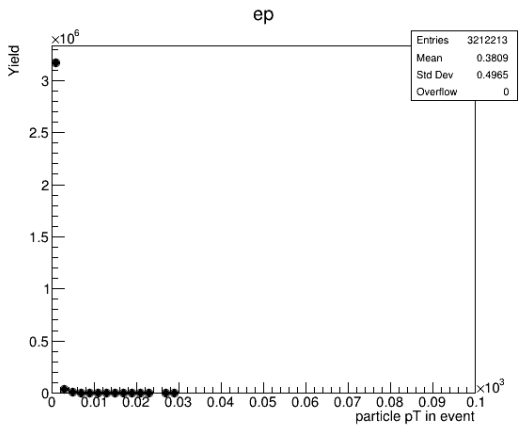


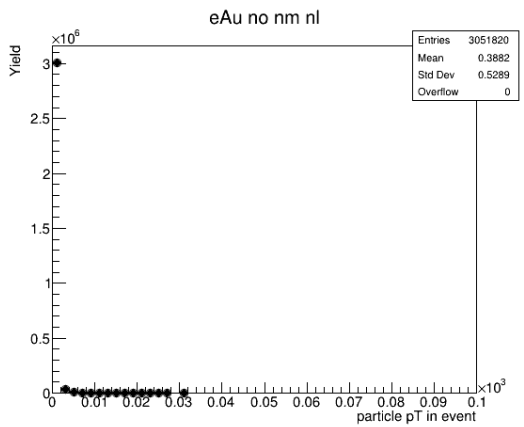
Cronin Effect (all particles)

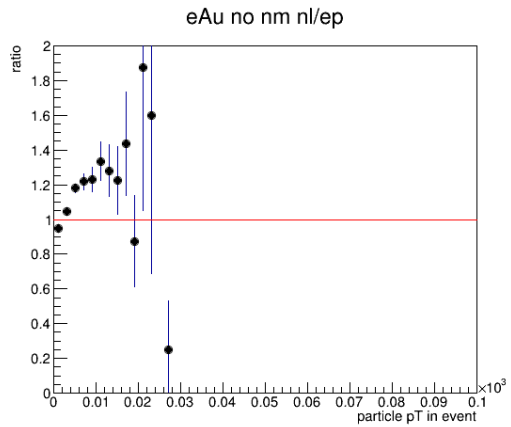


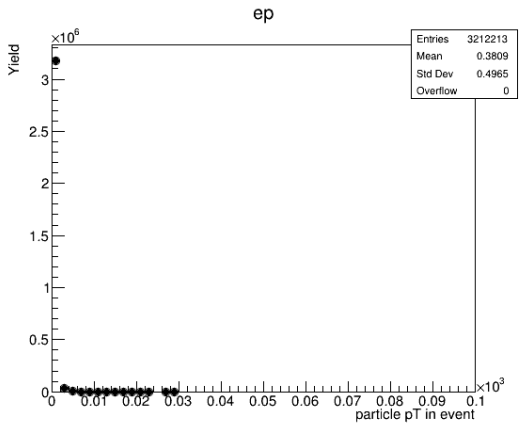


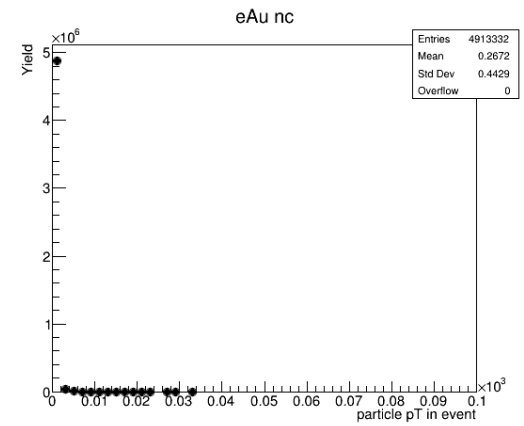


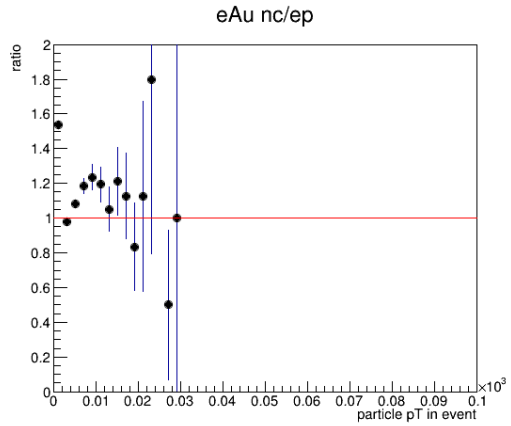












Summary

- nuclear cascade controls how many nucleons interact with incoming electrons
- only with nc turned on, will parton quenching behave correctly; without other nucleons involved, the partons resulted from parton quenching may just lost, therefore a smaller multiplicity.