Λ_c production in ep collisions in PYTHIA v8.3 with Au PDF

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PYTHIA set ups

- Same as ep collisions
- Method 1 – change proton PDF, such as

  PDF:pSet=LHAPDF6:EPPS16nlo_CT14nlo_Au197

- Method2 - Not change proton PDF, add nuclear modifications in hard process
  - The final PDF = an average nucleon within given nucleus
  - $f_i^A(x,Q^2) = \left(\frac{Z}{A}\right) * f_i^{\frac{p}{A}} + \left(\frac{A-Z}{A}\right) * f_i^{\frac{n}{A}}$
  - PDF:useHardNPDFA=on (beam A is proton and beam B is electron)

    PDF:nPDFSetA=1 (option 0 - Only Isospin effect.
    option 1 : EPS09, LO.
    option 2 : EPS09, NLO.
    option 3 : EPPS16, NLO.)

    PDF:nPDFBeamA=100791970 (Au^{197} PDG code)

Use this set up in this report

Check PDF with PYTHIA8 class

- modified from example: main51.cc
- PDFPtr intPDF = pythia.getPDFPtr(2212, 2 , “A”, true); //get proton PDF
- EPS09* eps09 = new EPS09(100791970 , 1 ,1 ,”pythia PDF doc address”, intPDF , &info);

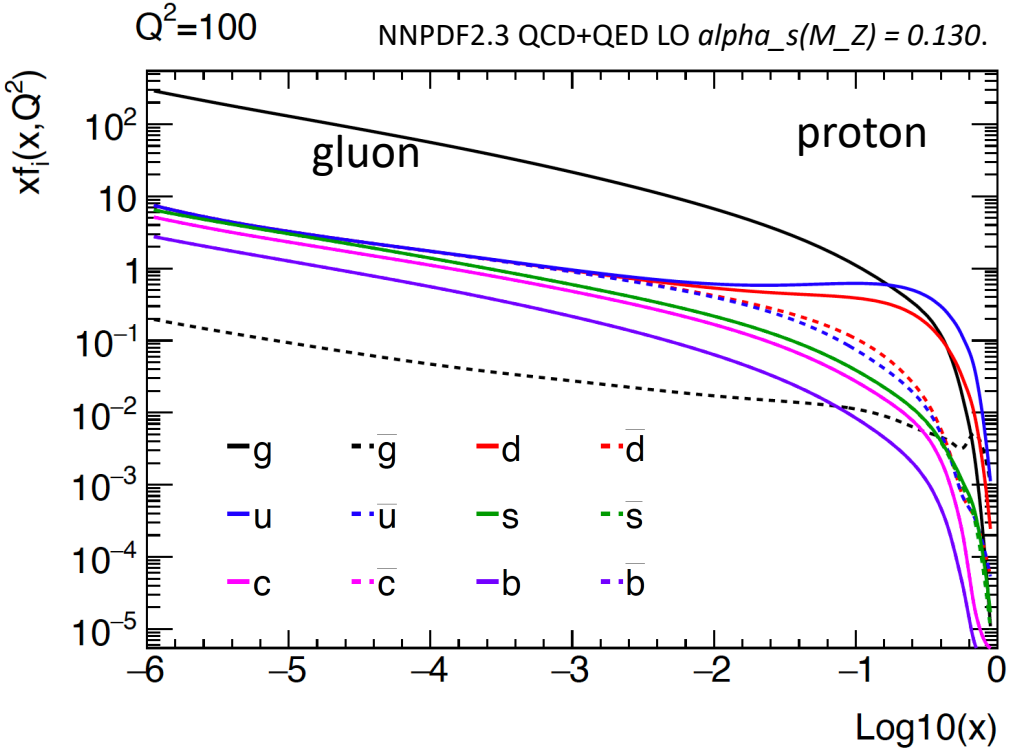
PYTHIA8::Info

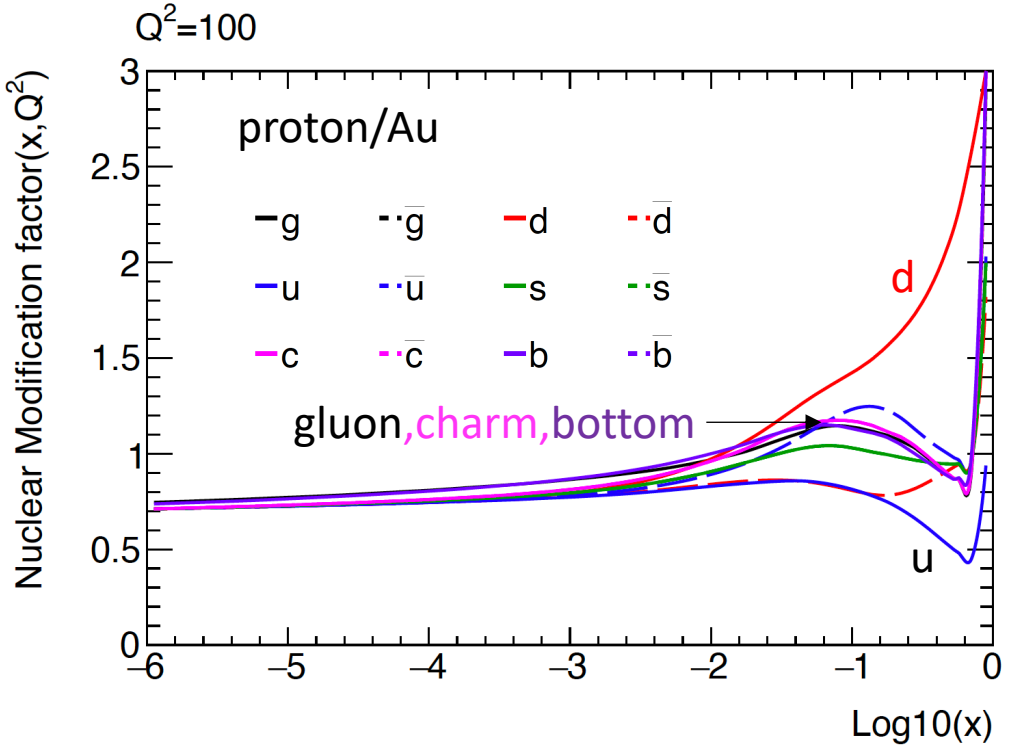
Au PDG code

pointer to proton PDF

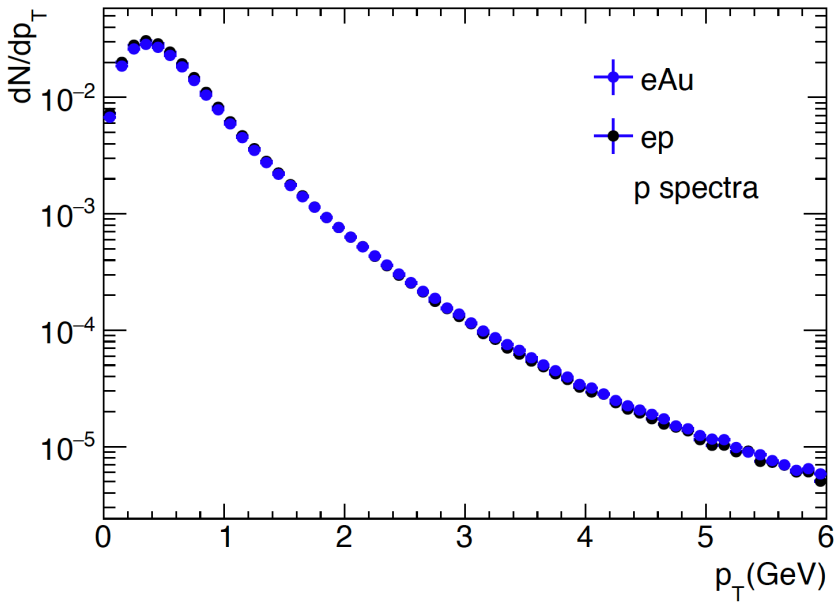
PYTHIA internal class for nuclear PDF calculation with nuclear modification

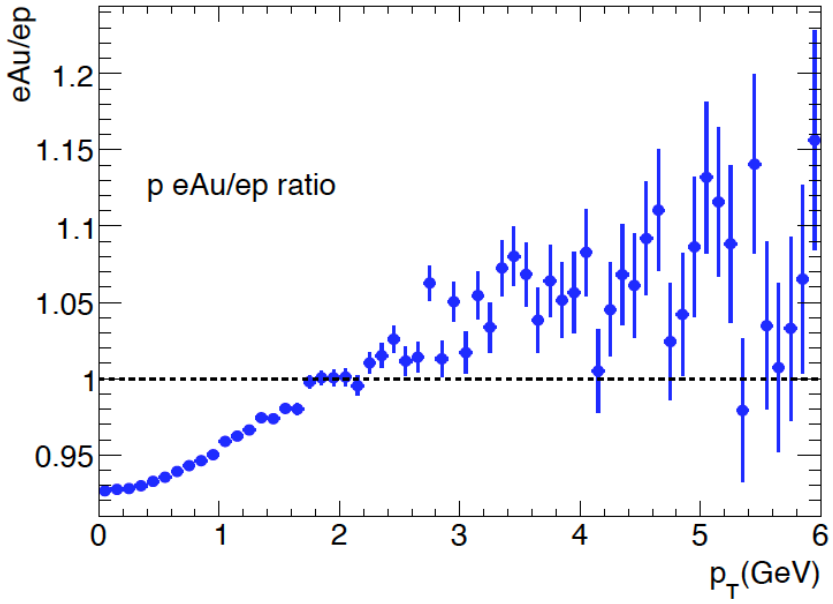
xf = PDF->xf(id, x, Q2) parton x and Q^2

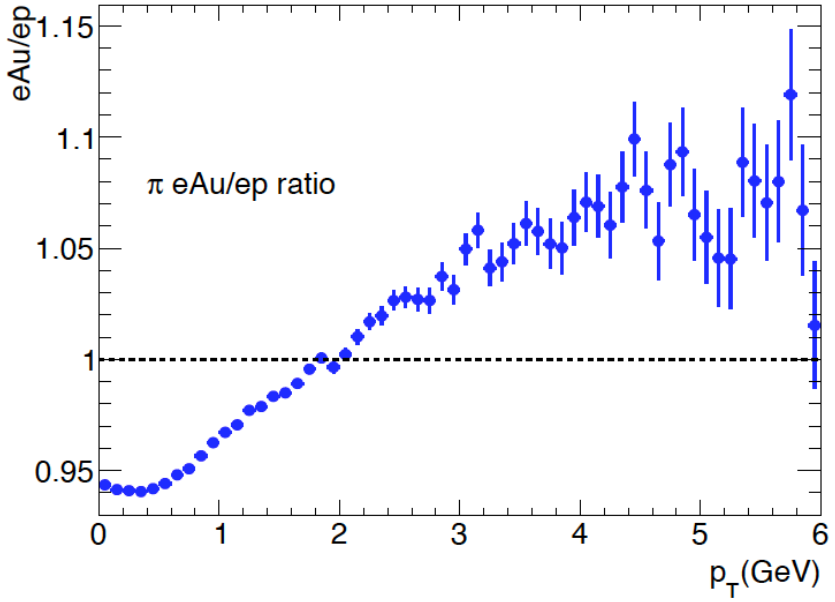


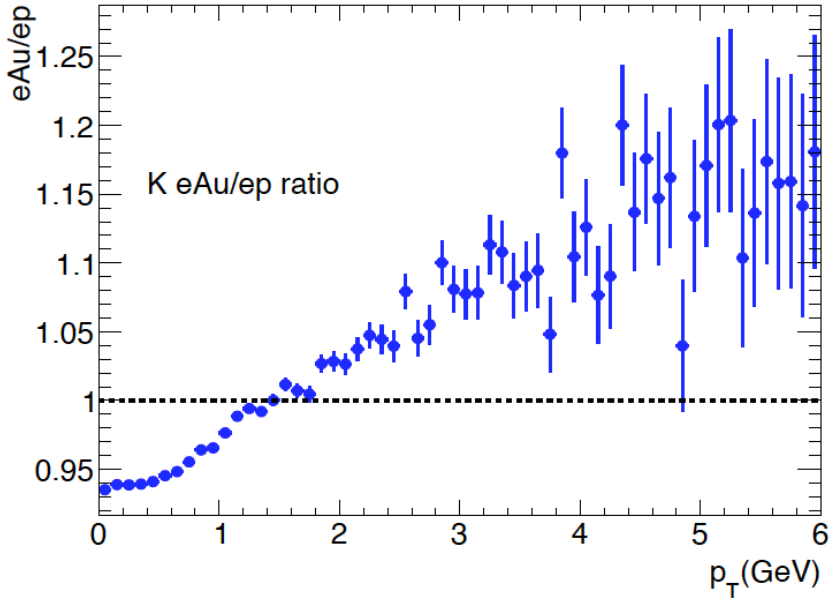


Identified particles

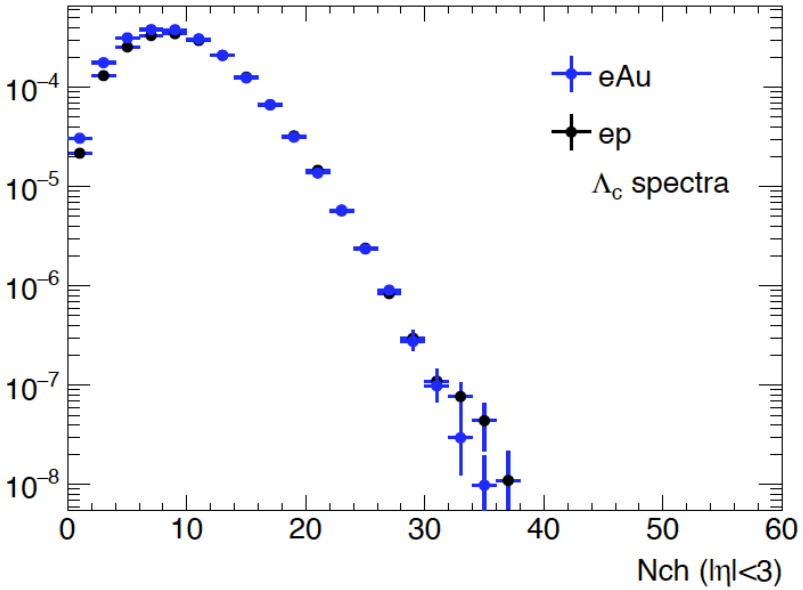


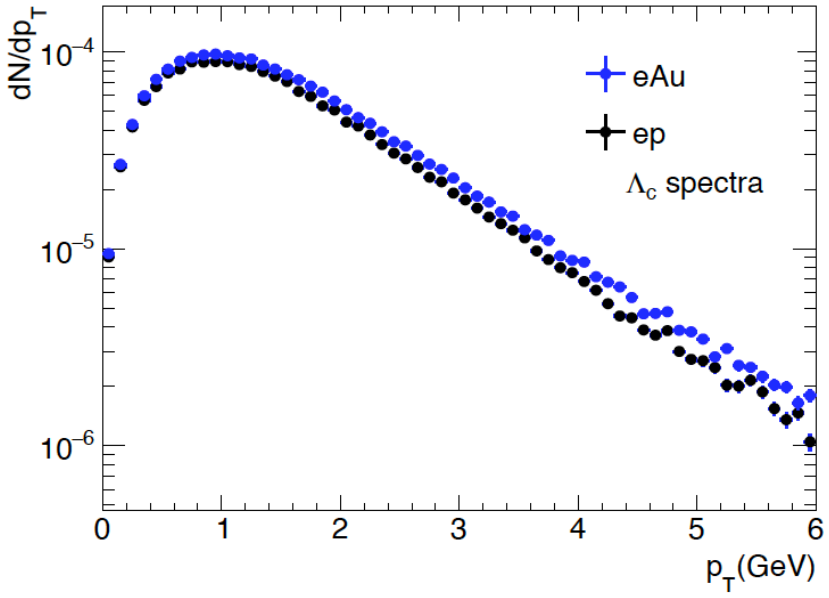


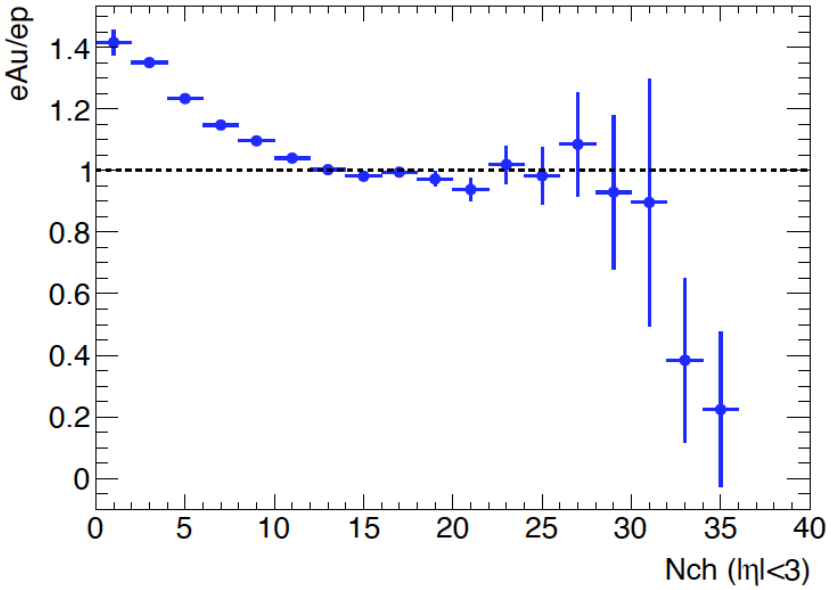


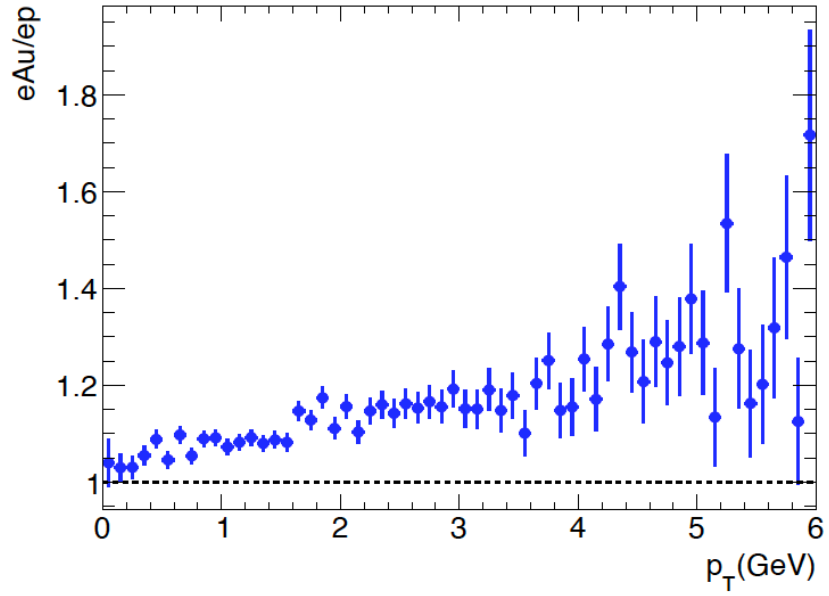


Λ_c spectra

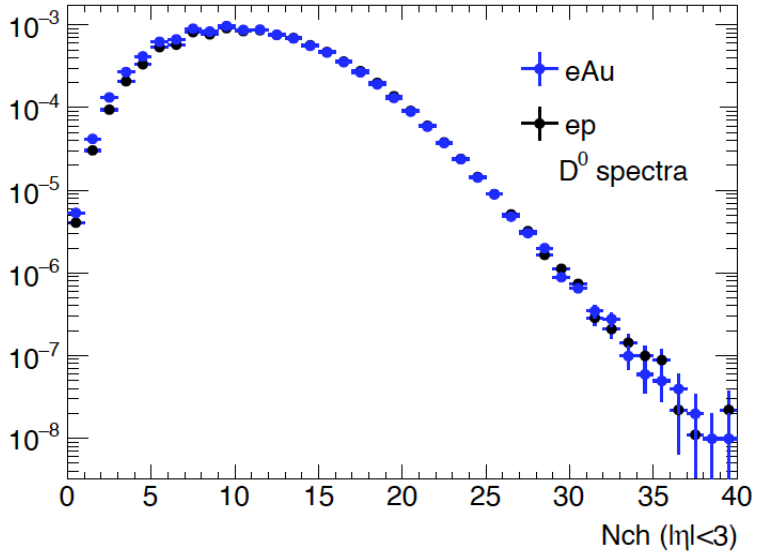


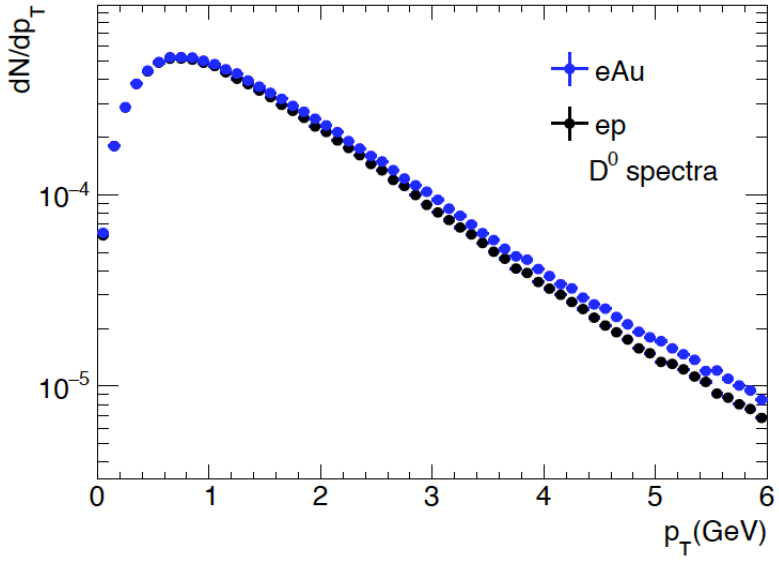


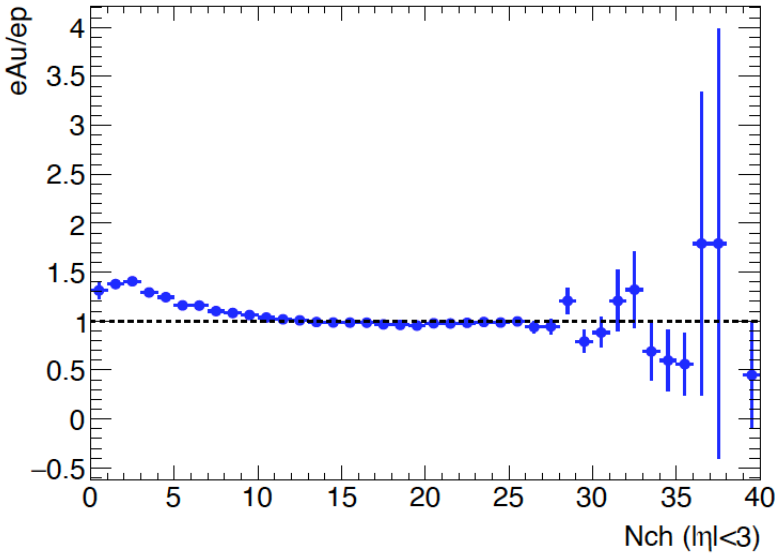


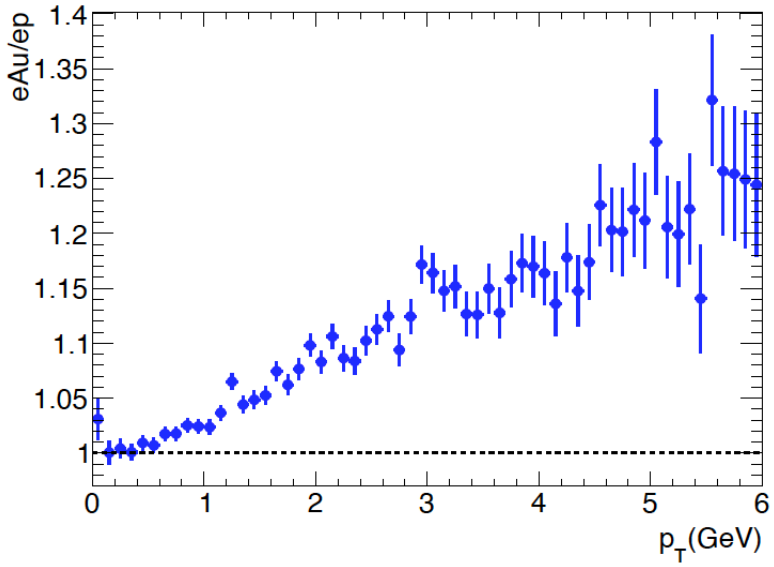


D^0 spectra

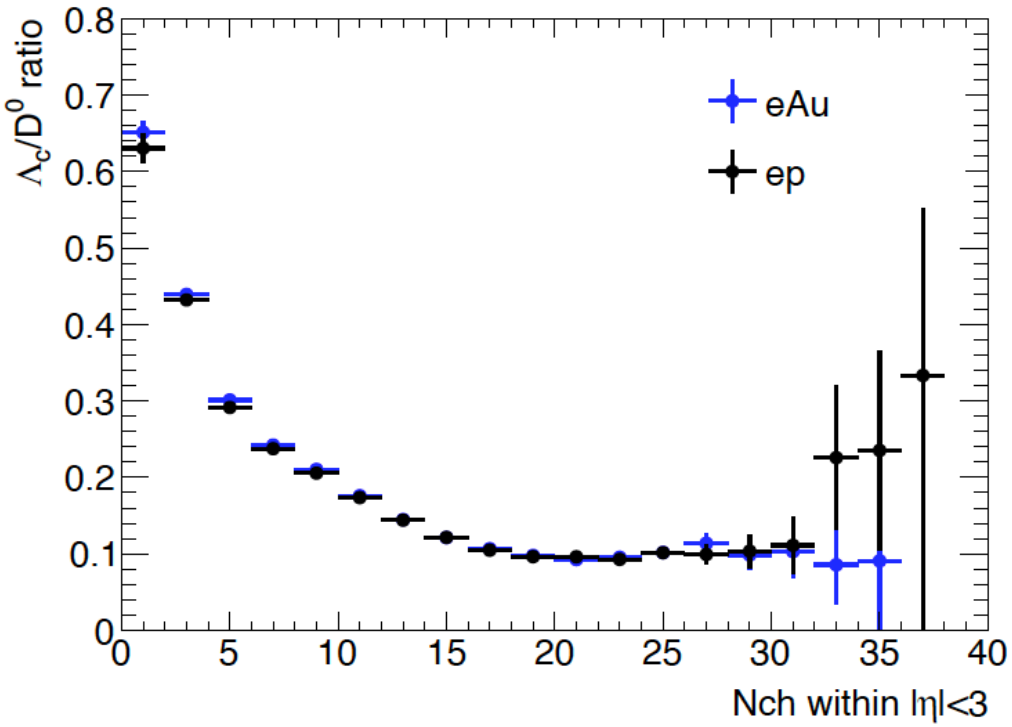

eAu
ep
D0 spectra
Nch (|η|<3)

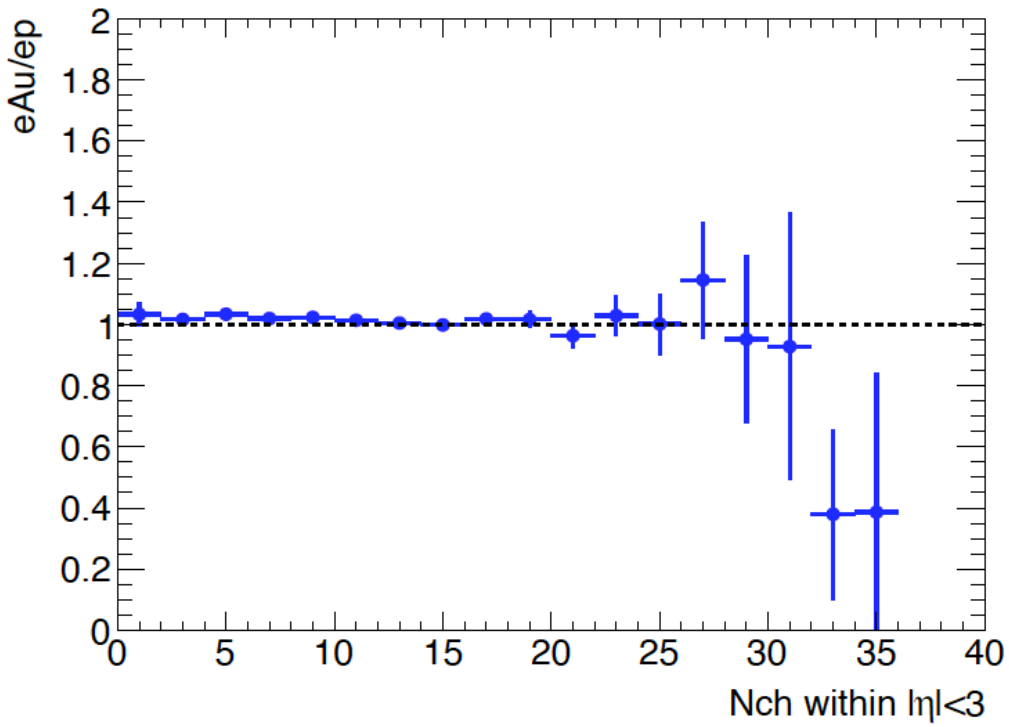

dN/dpT
eAu
ep
D0 spectra
pT(GeV)


eAu/ep
Nch (|η|<3)


eAu/ep
pT(GeV)

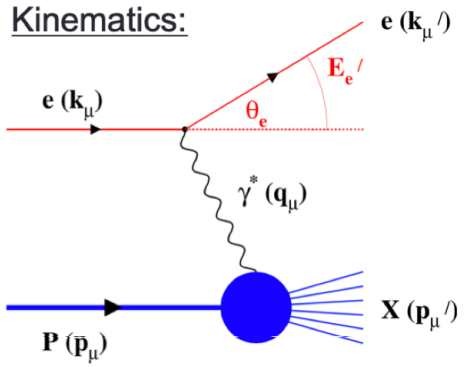
Λ_c/D^0 ratio





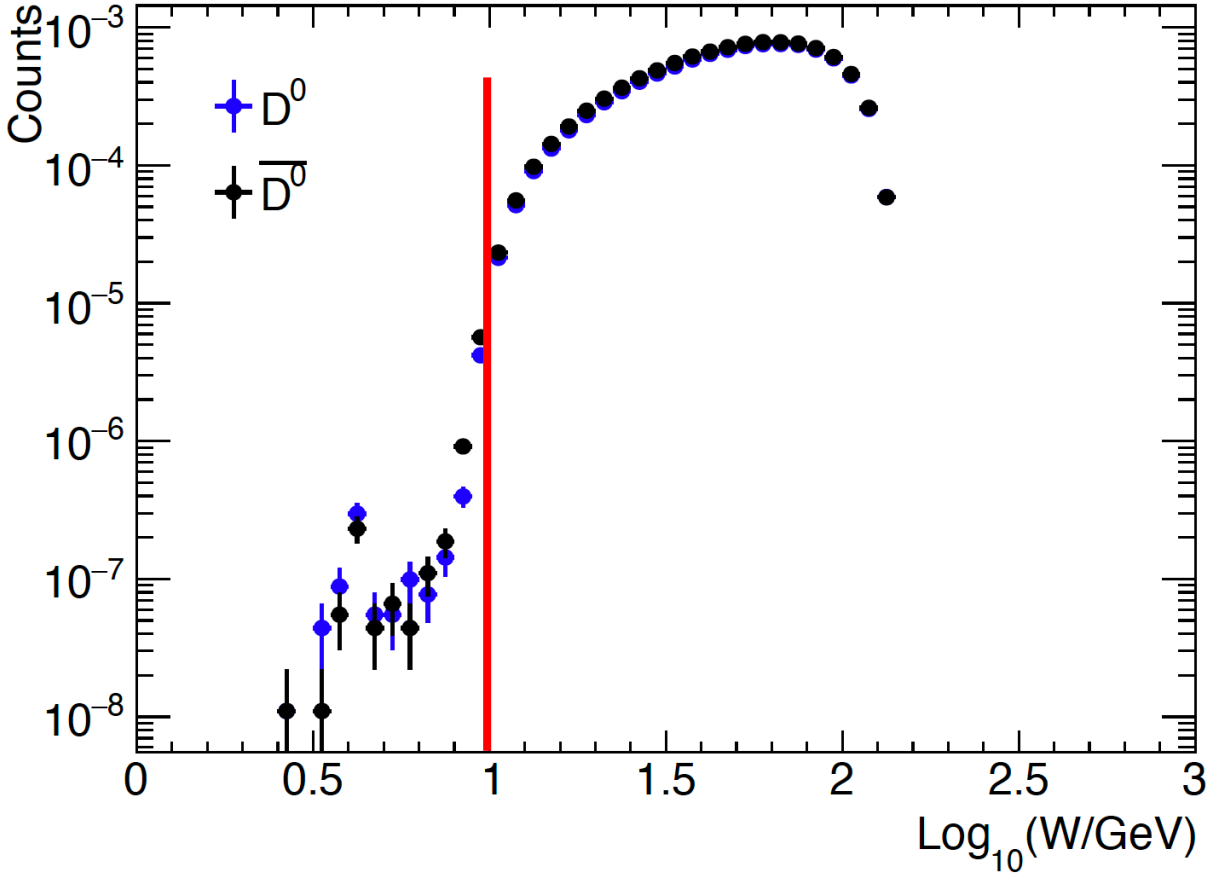
W dependence

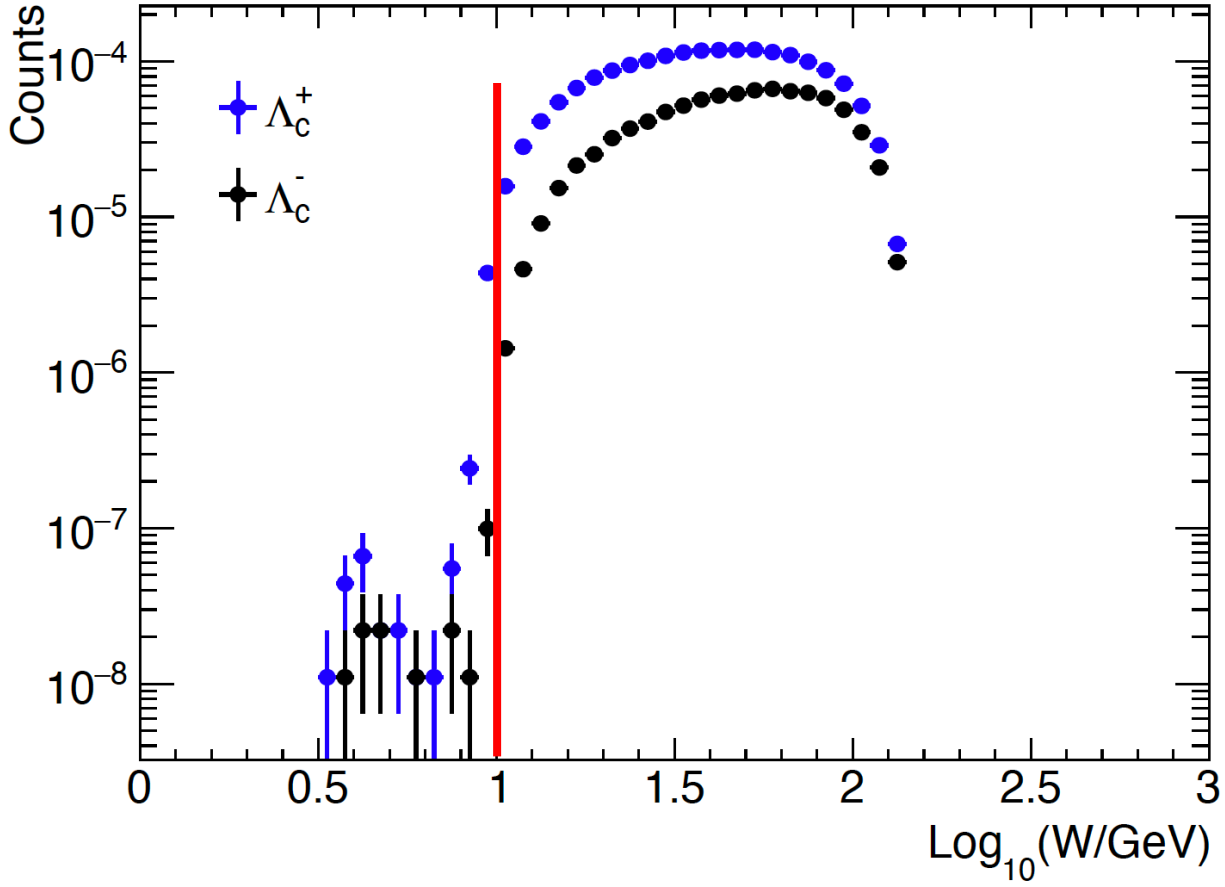
Multi Parton Interaction
threshold: W >10 GeV

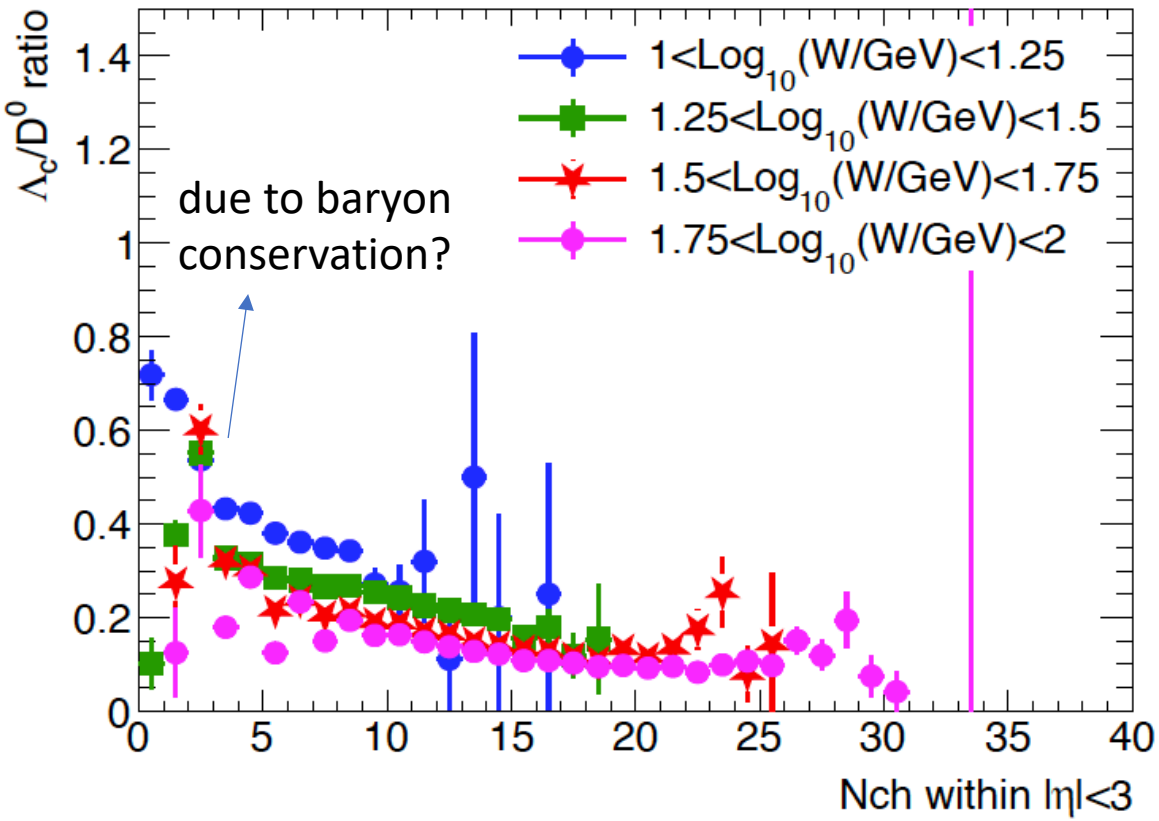


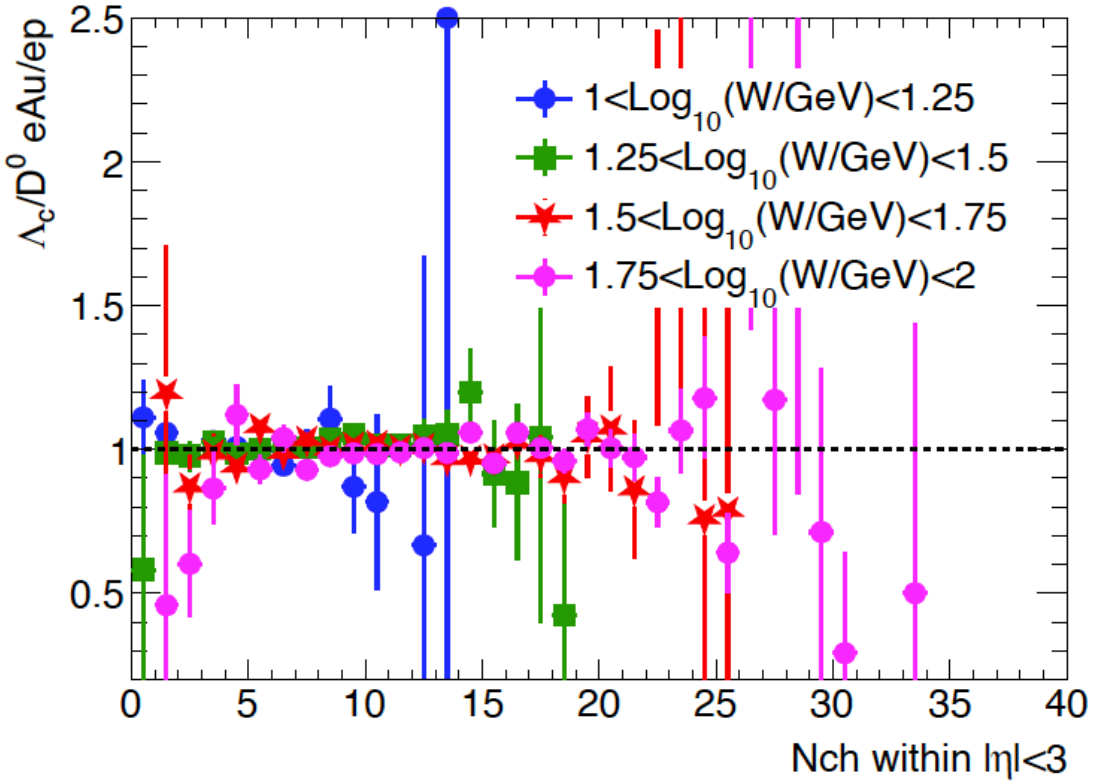
W: invariant mass of ($\gamma^* + p$)

ep collisions

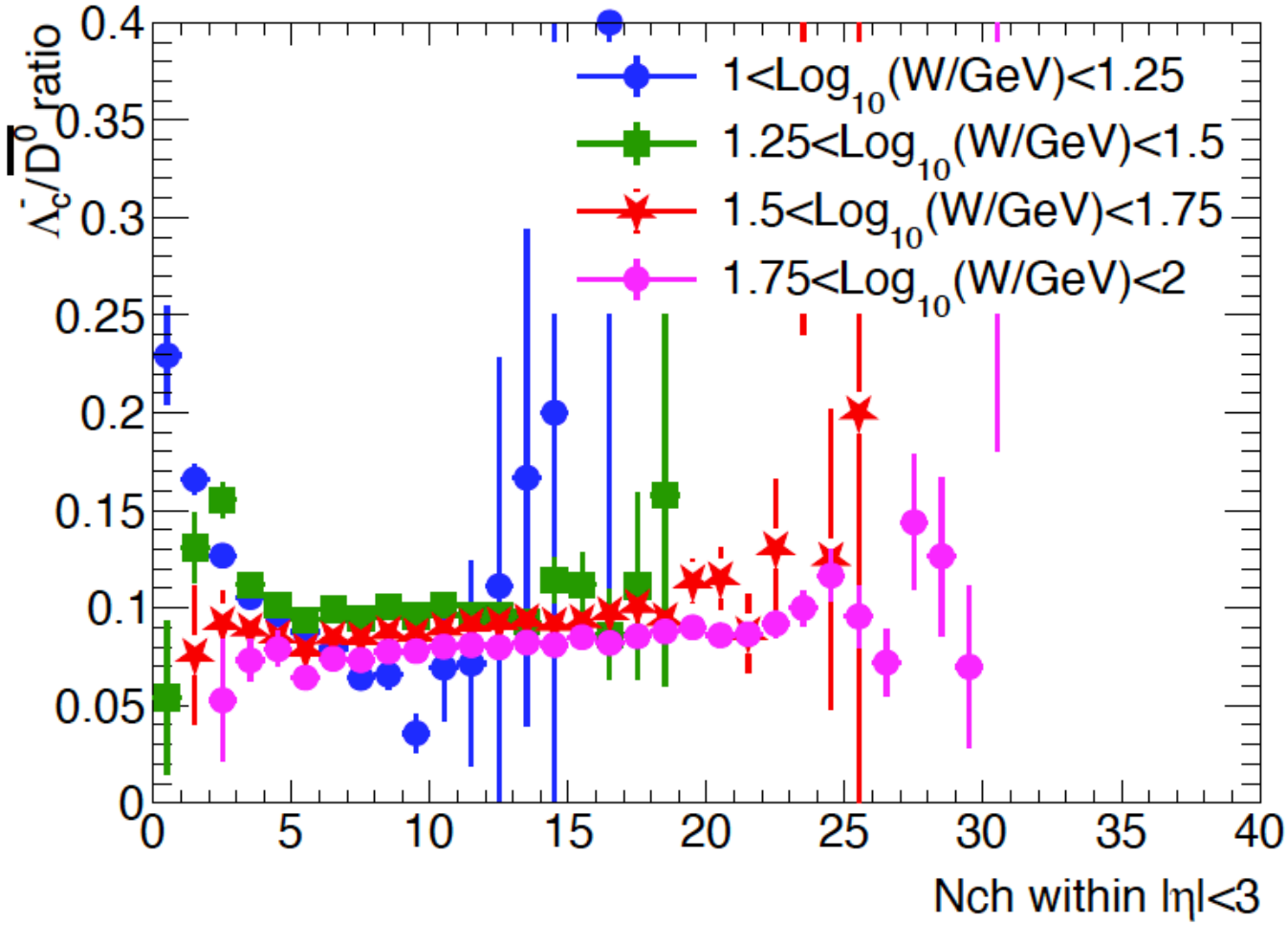








similar performance with different PDF



the enhanced production of baryon at low Nch is not due to quark component