Code QA for Collins paper (psn0782)

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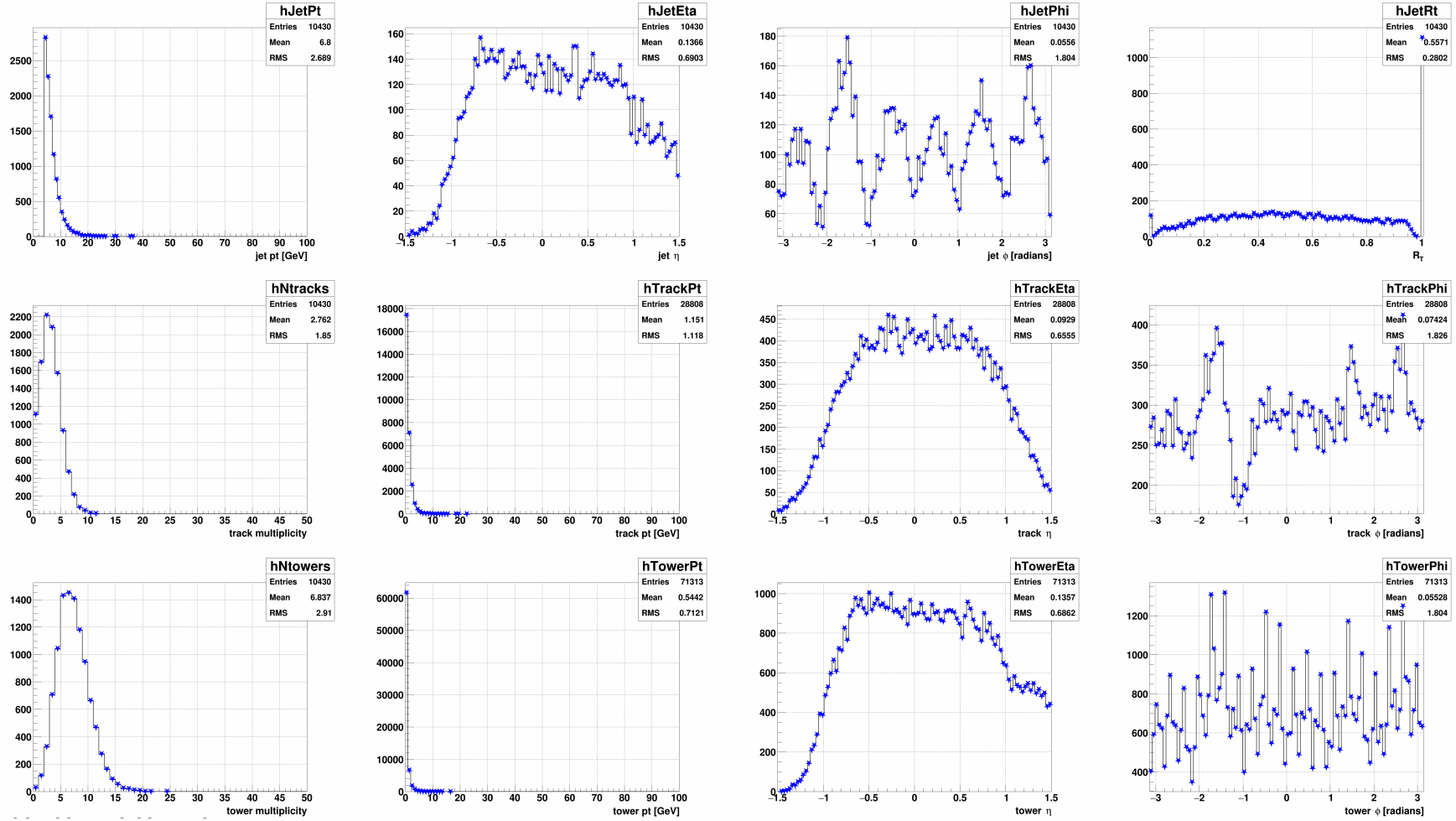
Dec. 16, 2021

Outline

- Run 15 jet tree check for data and embedding
- Run 12 code QA procedure
- Paper final plots reproduce

Run 15 jet tree check for data

- MuDst file example: st_physics_16065016_raw_4500026.MuDst.root
- Use ReadJetTree.C from Ting to read the jet tree.

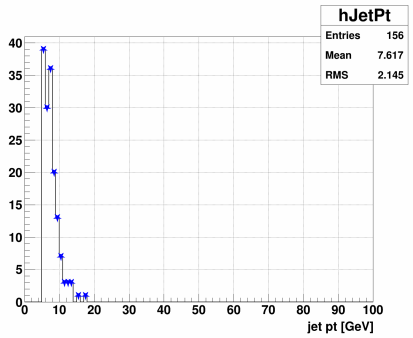


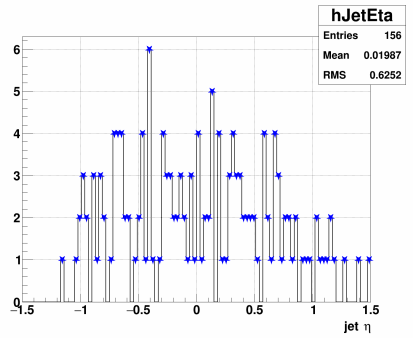
Solid lines are Ting's jet tree;

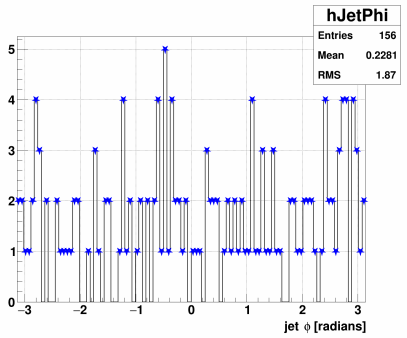
Blue points are my code QA jet tree

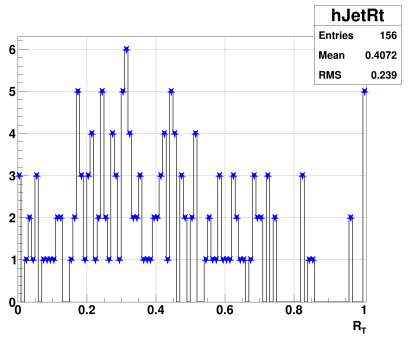
They are matched!

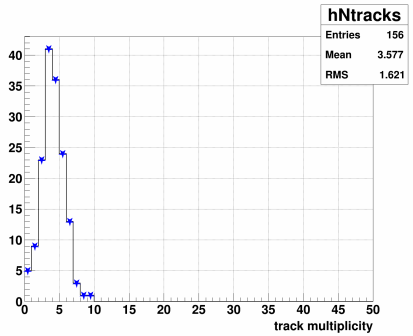
Run 15 jet tree check for embedding

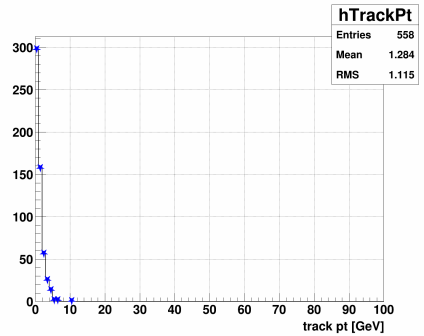


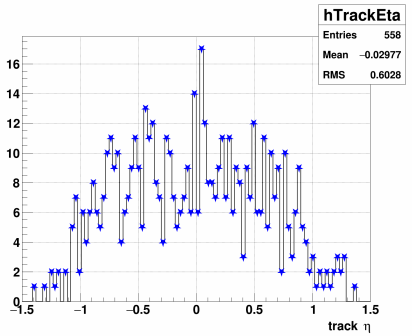


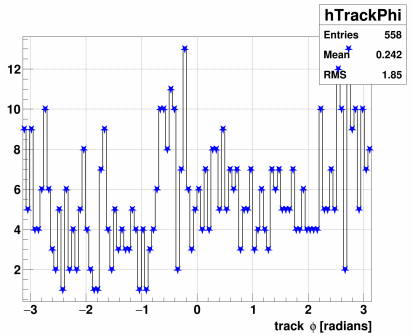


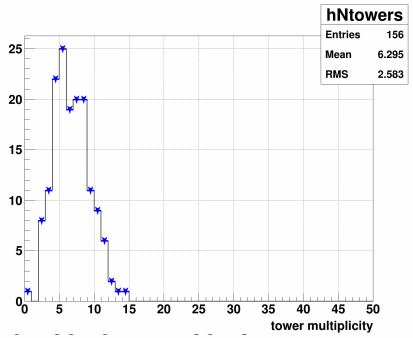


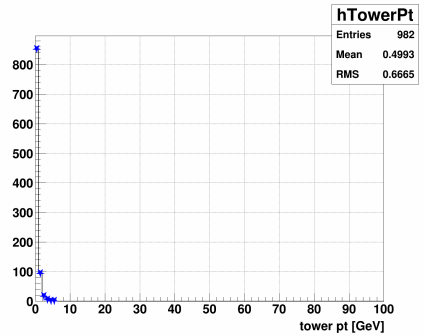


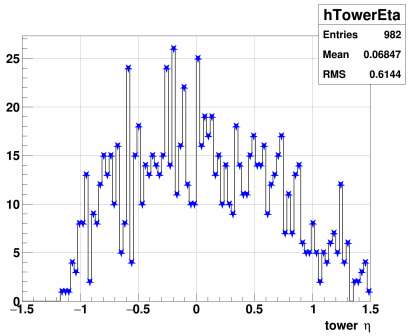


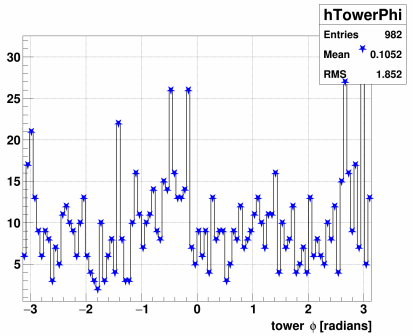












Solid lines are Ting's jet tree;

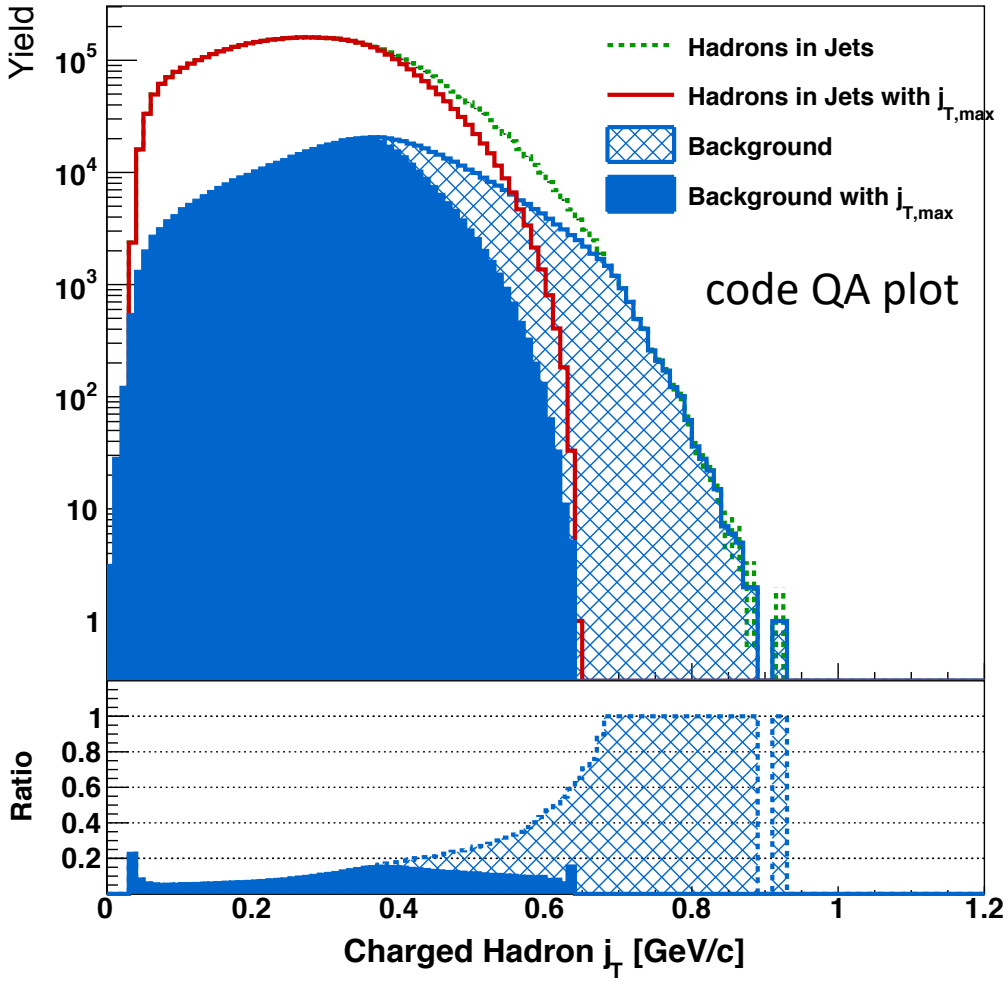
Blue points are my code QA jet tree

They are matched!

Run12 code QA procedure

- Produce jet tree and embedding. (we can’t do since the MuDst data are not at database.)
- Produce histograms based on jet trees, embedding and pythia.
- Analysis and calculate asymmetry
  - Calculate raw asymmetry
  - Correct the raw asymmetries with pion contaminations
  - calculate the azimuthal resolution
  - get Trigger bias, matching fraction, kinematic shifts , leak through asymmetry

Paper plot Fig. 3



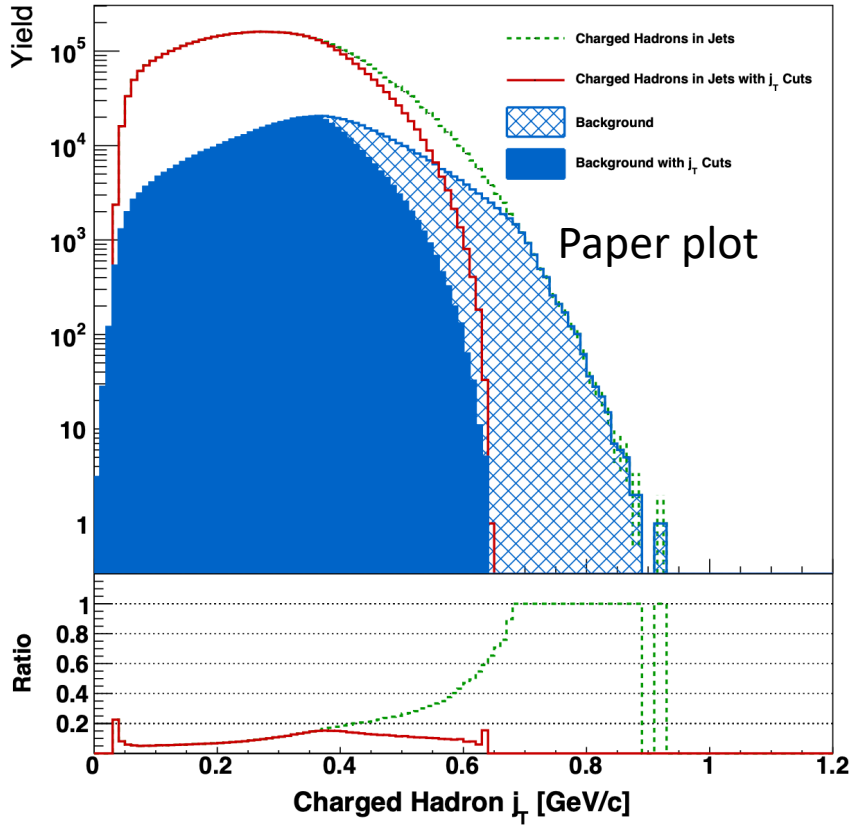
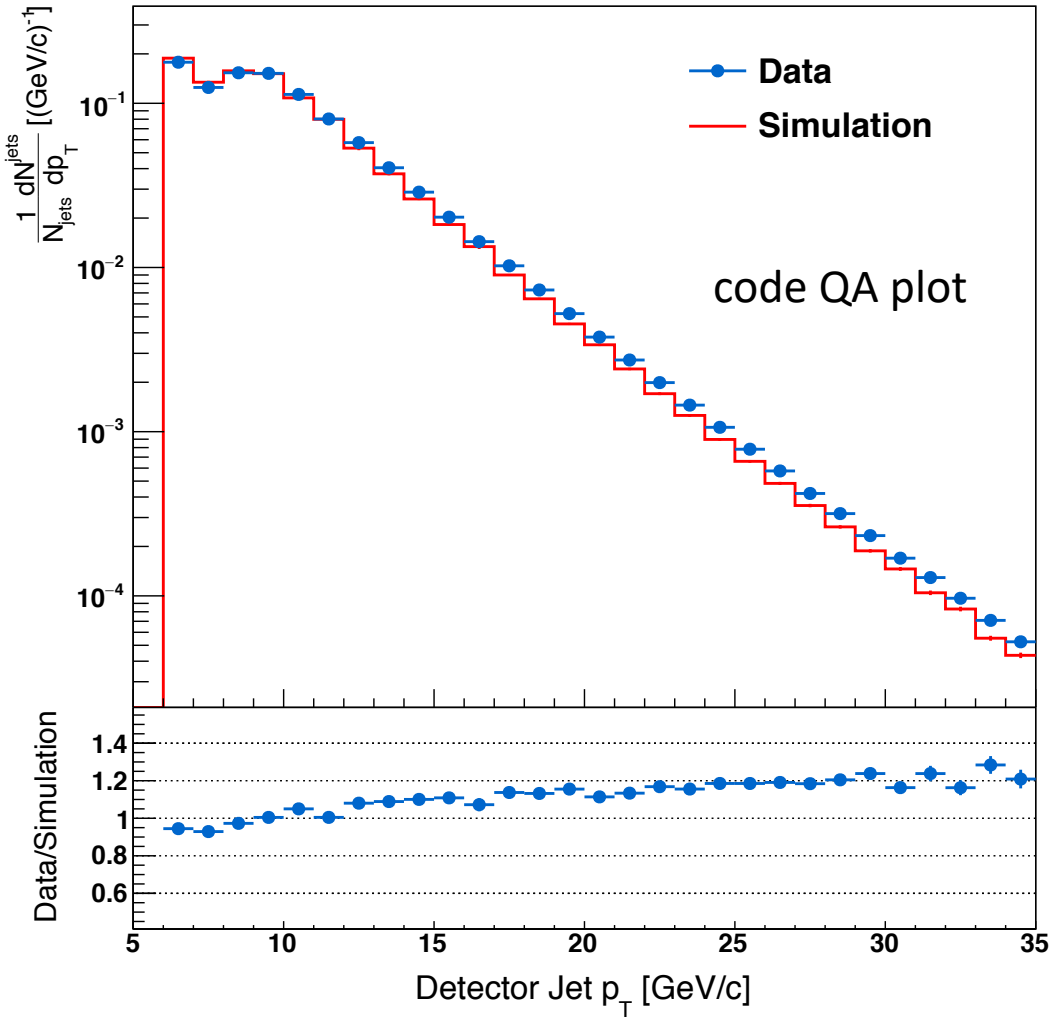


FIG. 3. Distribution of the charged hadrons inside jets as a function of the hadron momentum transverse to the jet thrust axis, j_T, for jets with $6.0 < p_T < 7.1$ GeV/c and hadrons with $0.1 < z < 0.2$. The lines show all the hadrons inside the jets, while the blue filled areas are the background from the off-axis cones before and after the upper j_T cut described in Eq. (3).

Paper plot Fig. 4



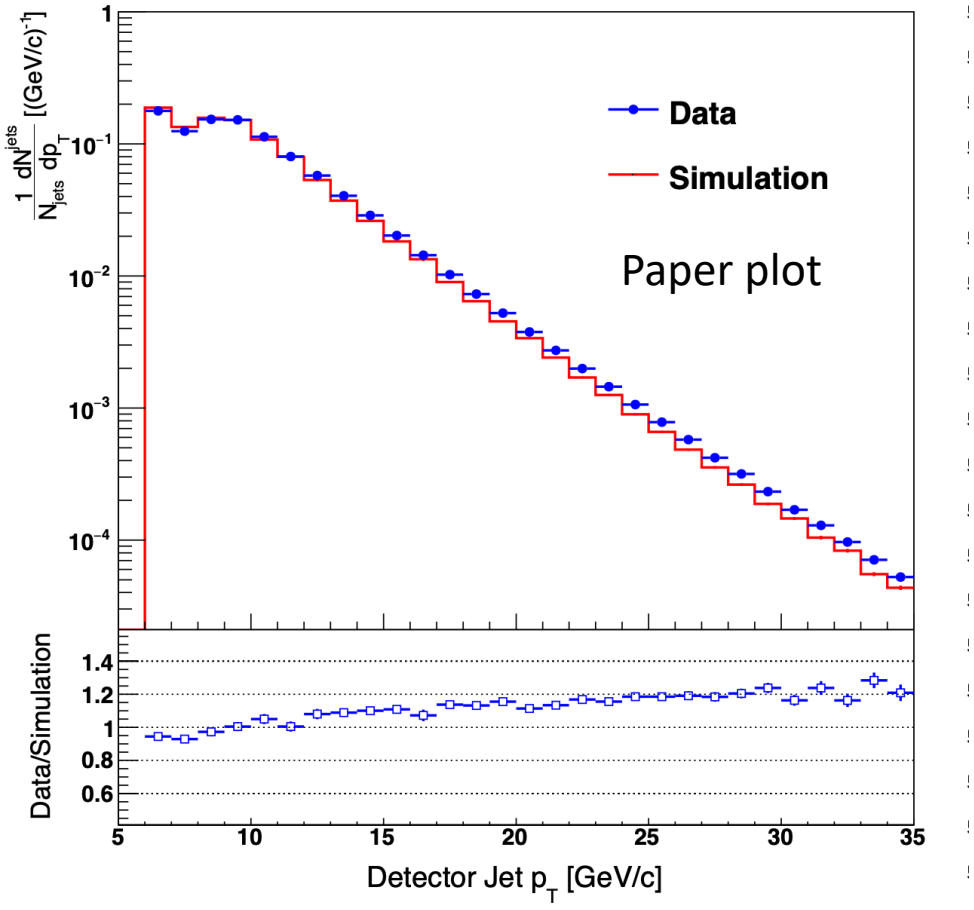
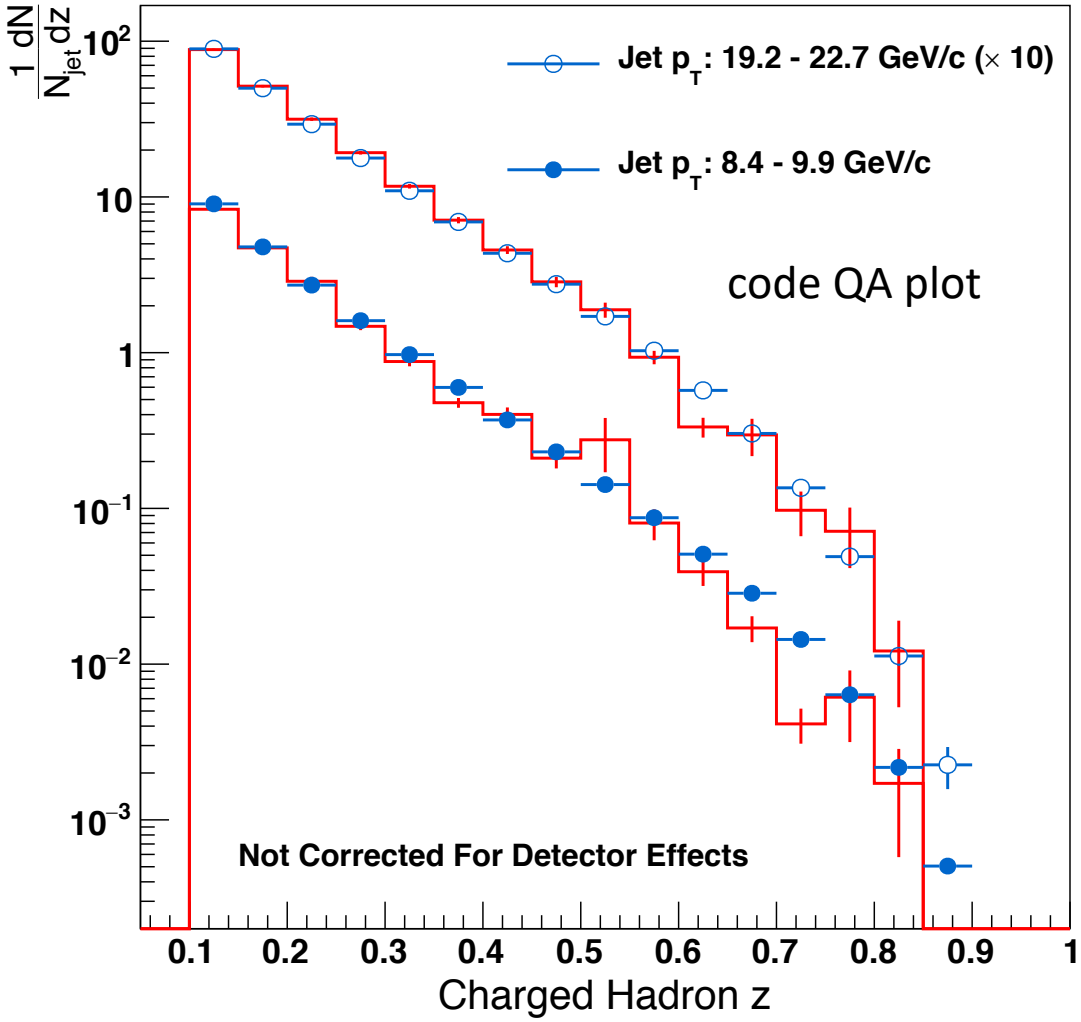


FIG. 4. Distribution of the normalized jet yield as a function of detector jet transverse momentum, p_T, in data and simulation. The blue solid circles represent the data, and the red histograms are the simulation. The lower panels show the ratio between data and simulation.

Paper plot Fig. 5



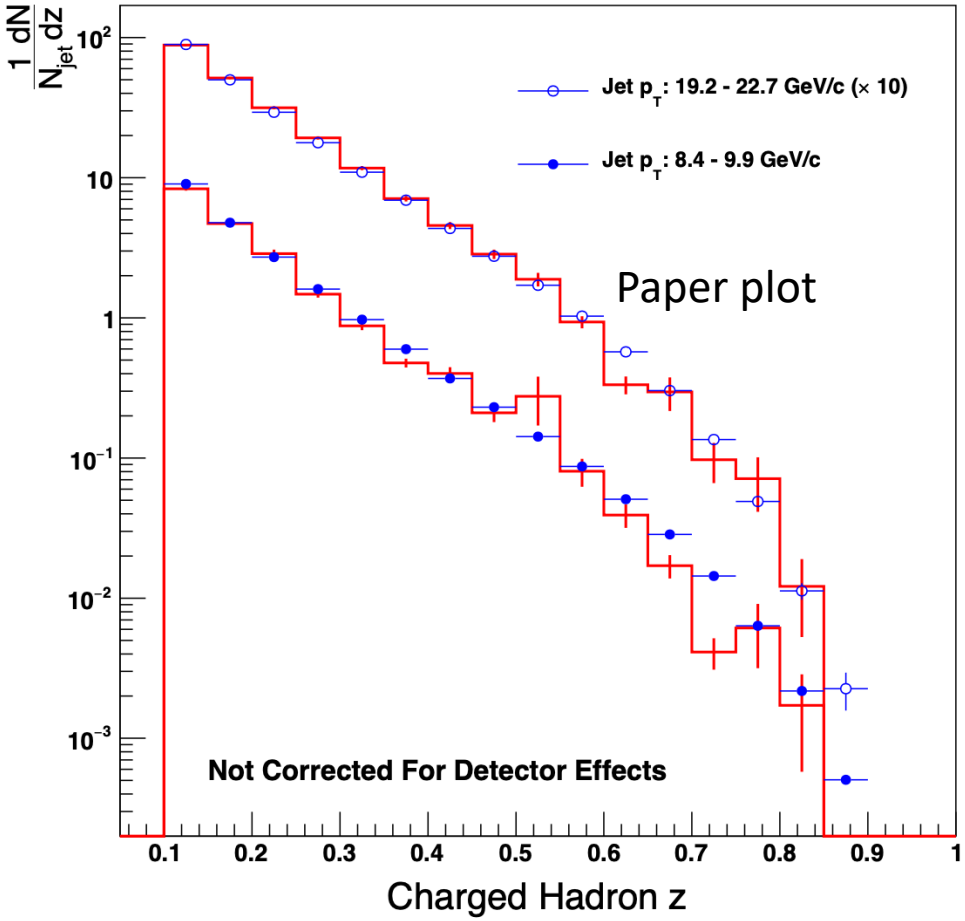
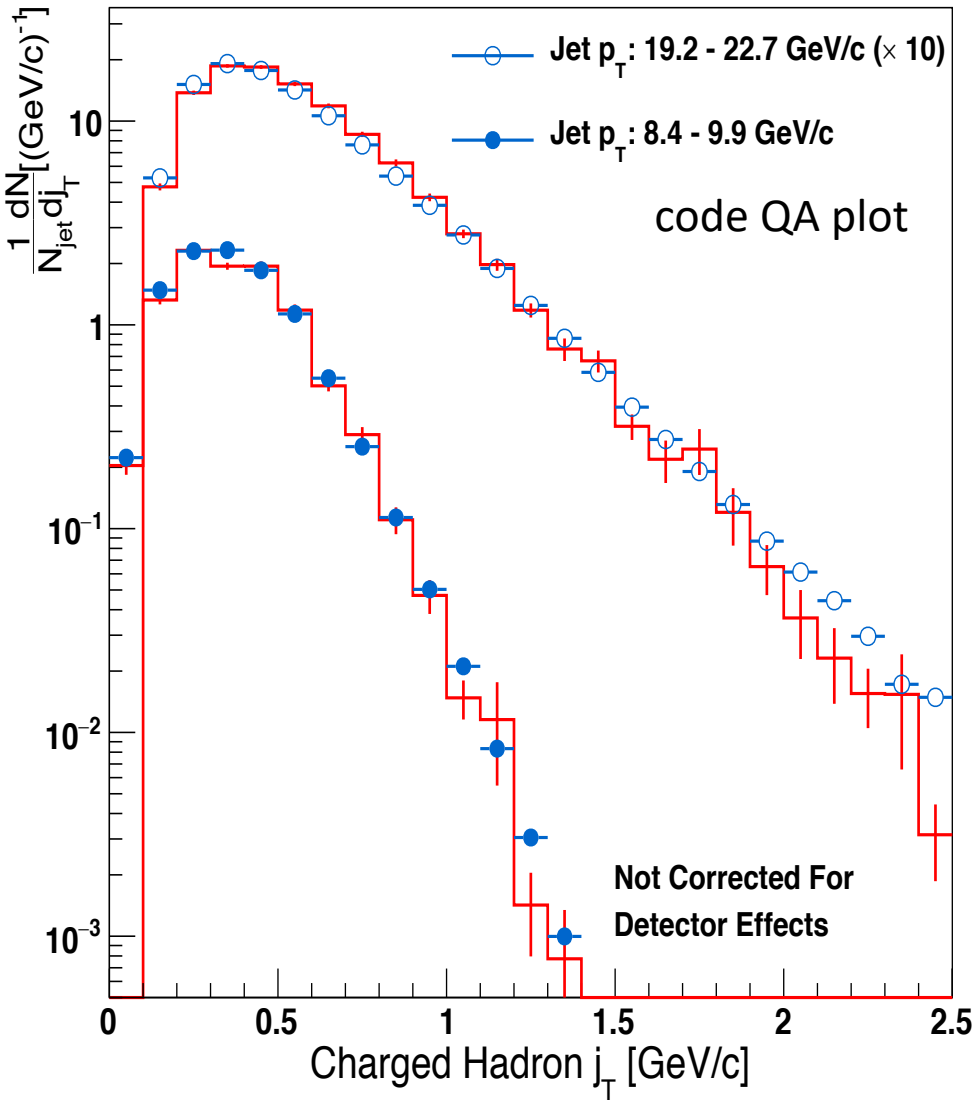


FIG. 5. Distribution of charged hadrons within jets in the 2015 data as a function of the hadron longitudinal momentum fraction, z, in two different jet p_T bins. The blue points represent the data, and the red histograms show the simulation.

Paper plot Fig. 6



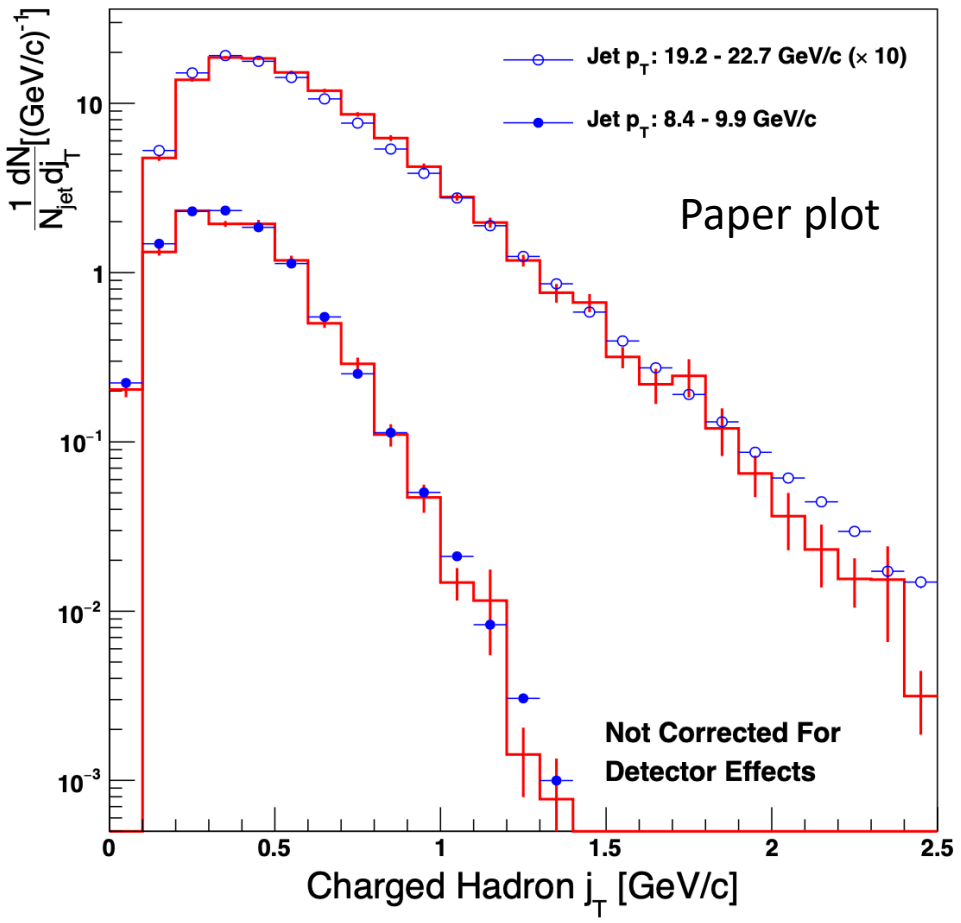


FIG. 6. Distribution of charged hadrons within jets in the 2015 data as a function of the hadron momentum transverse to the jet axis, j_T, in two different jet p_T bins. The blue points represent the data, and the red histograms show the simulation.

Paper plot Fig.7 (code QA plots are on top)

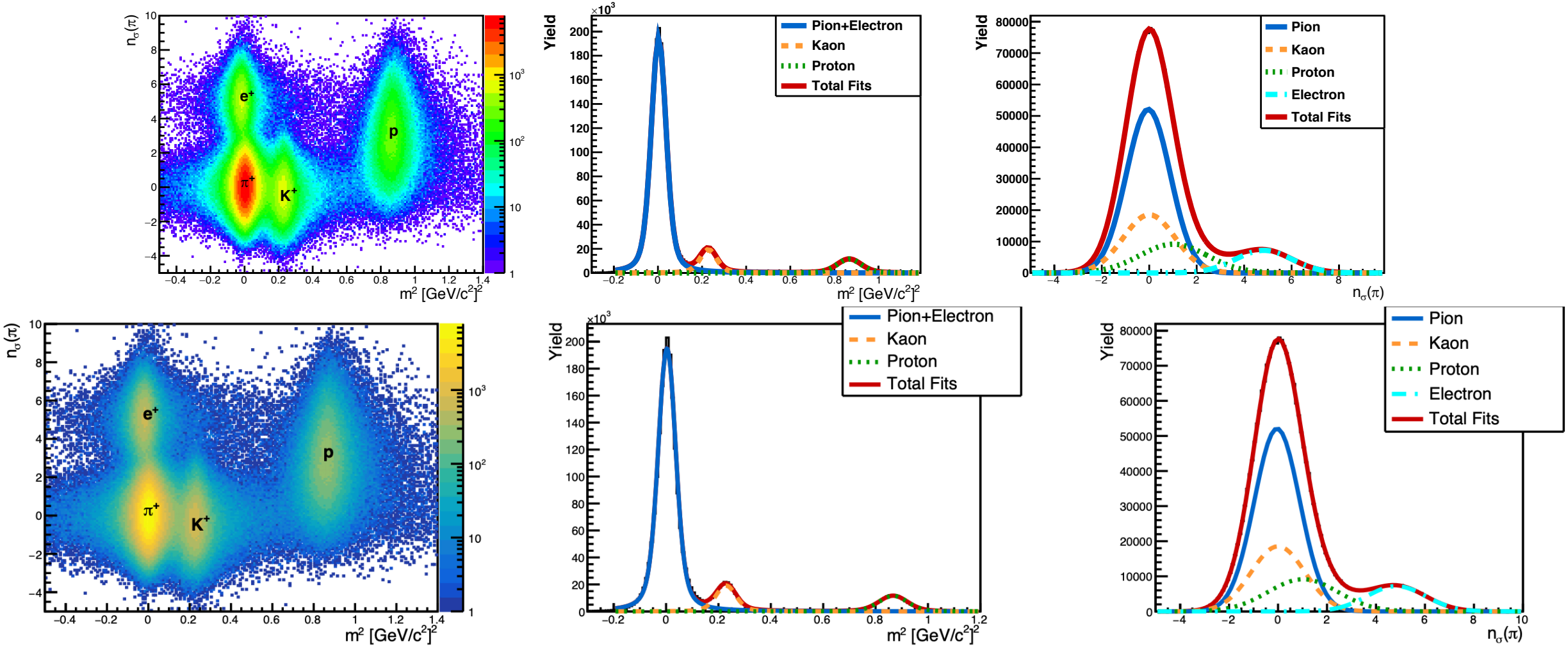
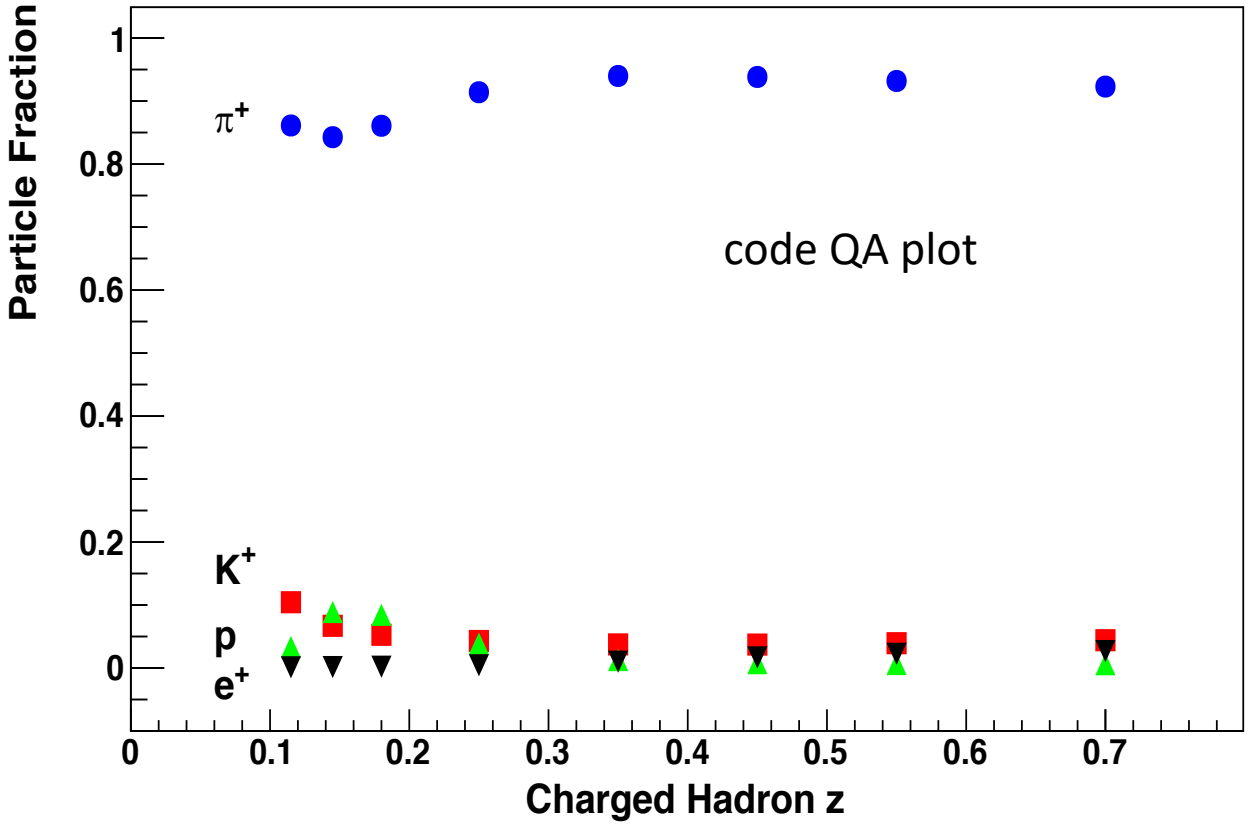


FIG. 7. Left: The correlations of $n_\sigma(\pi)$ *vs.* m^2 for positively charged particles carrying momentum fractions of $0.1 < z < 0.13$ in jets with $8.4 < p_T < 9.9$ GeV/c. Middle: Multi-Voigt profile fits to the m^2 distribution. Right: Multi-Gaussian fits to the $n_\sigma(\pi)$ distribution.

Paper plot Fig. 8



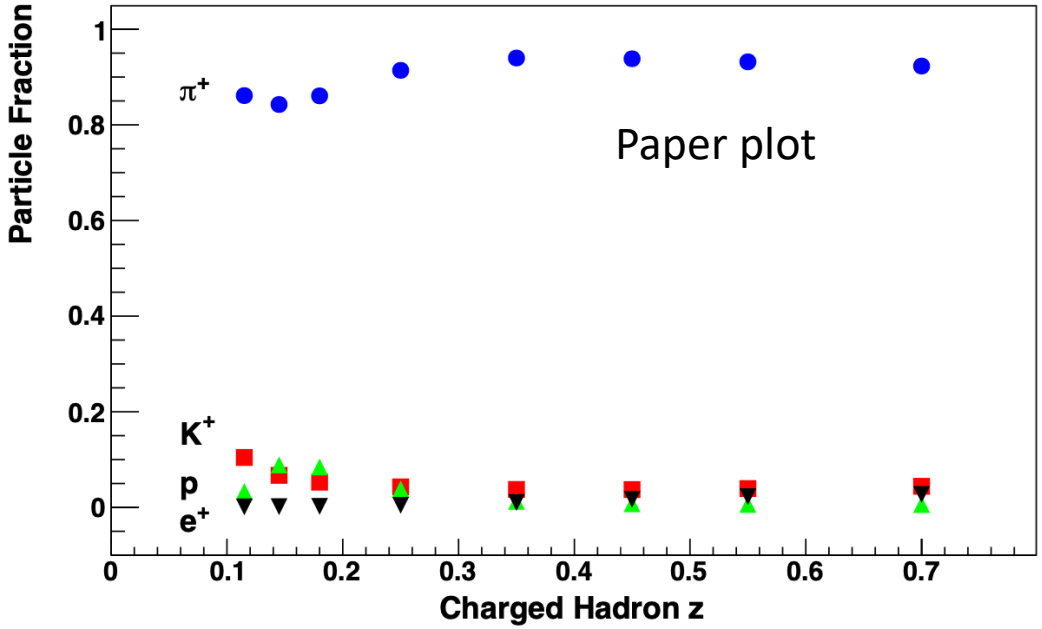
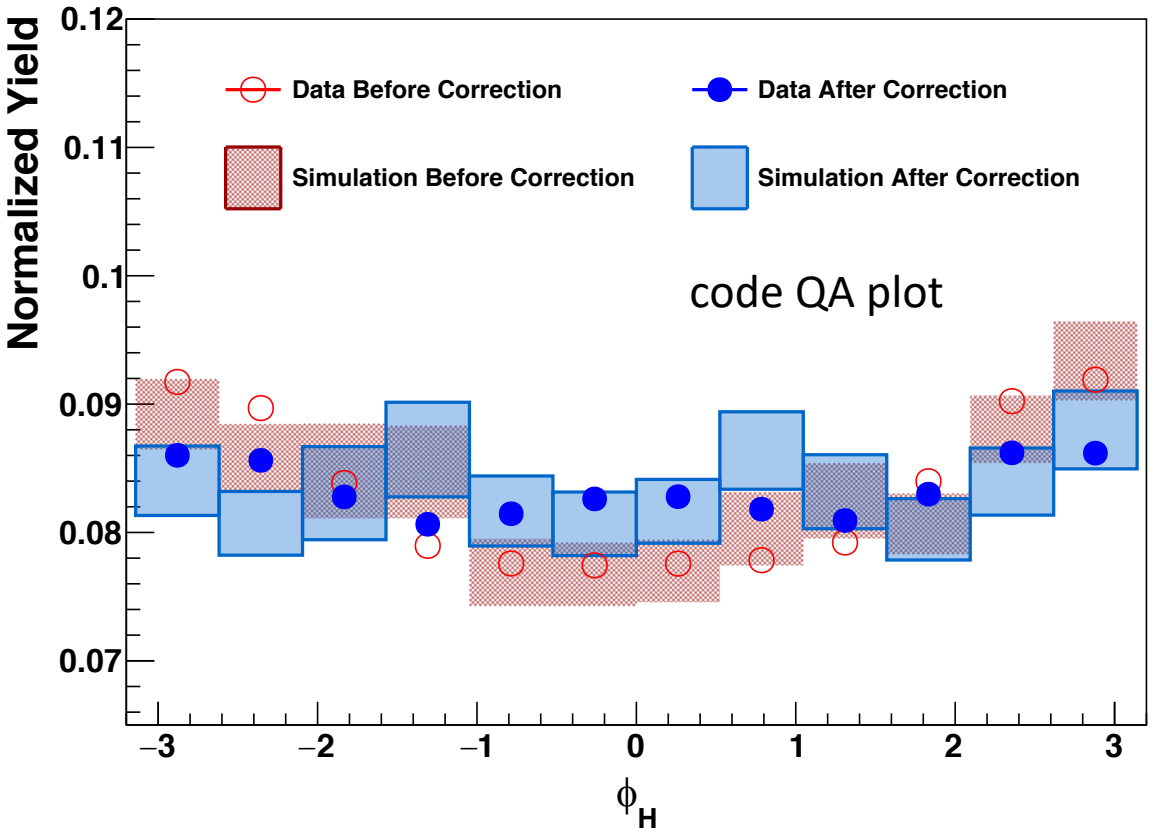


FIG. 8. Charged particle fractions as a function of the hadron longitudinal momentum fraction, z, for charged particles that satisfy $-1 < n_\sigma(\pi) < 2$ (pion-rich region), in jets with $8.4 < p_T < 9.9$ GeV/c. The blue solid circles are π^+, red squares are K^+, green up triangles are protons and the black down triangles are positrons.

Paper plot Fig. 9



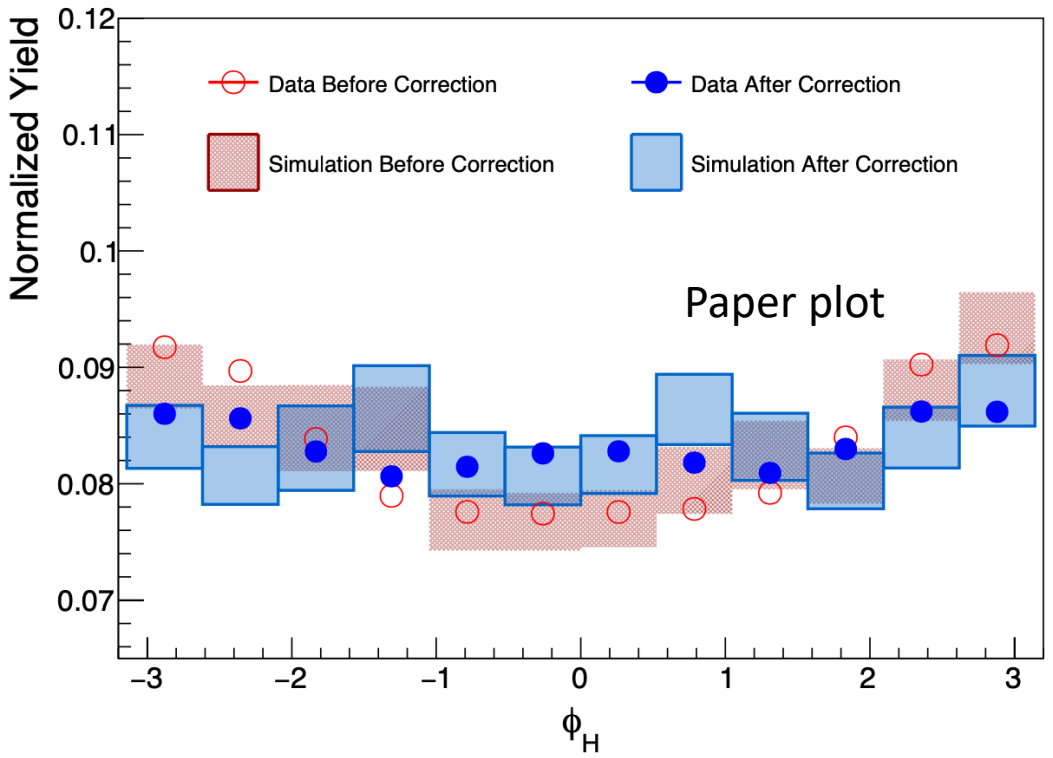
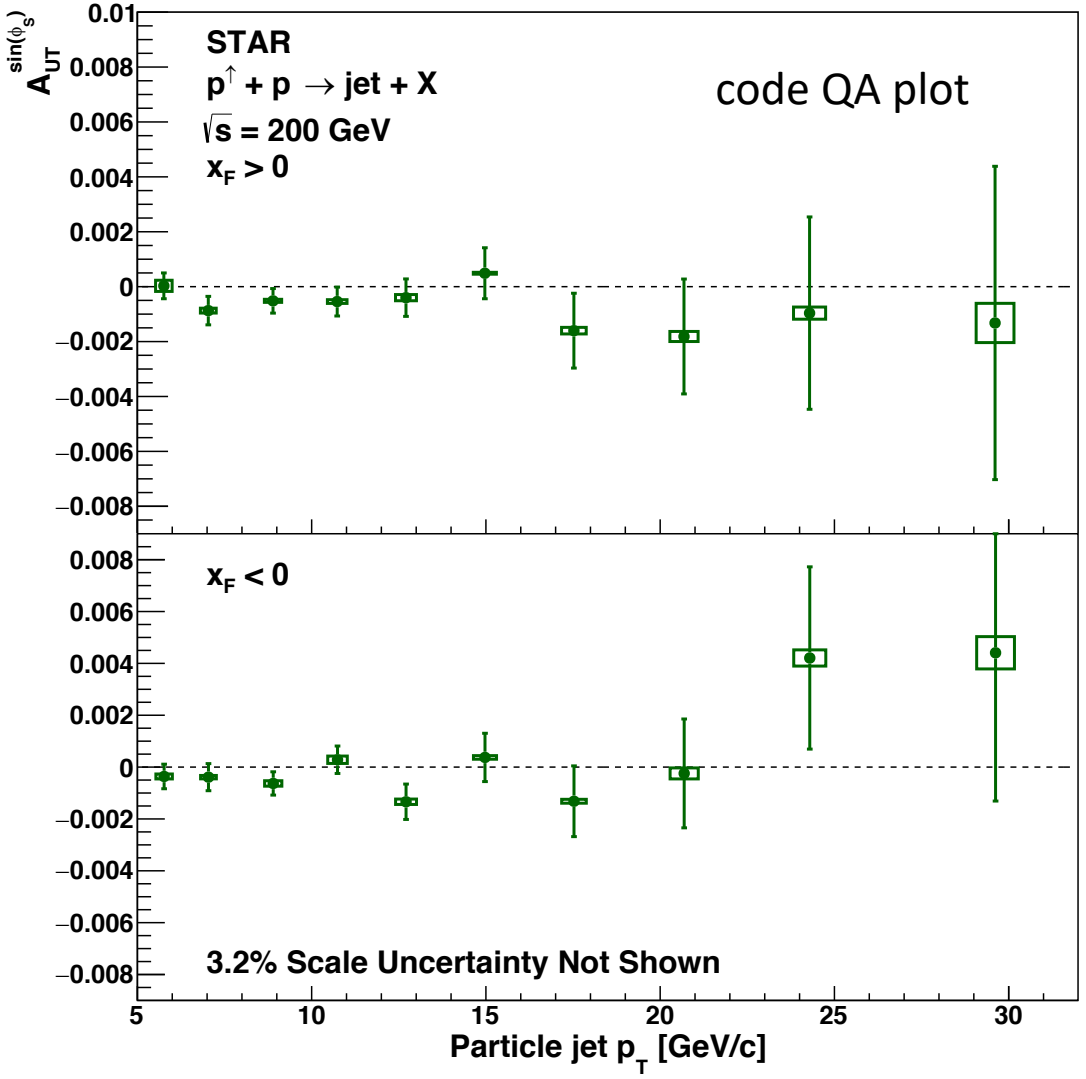
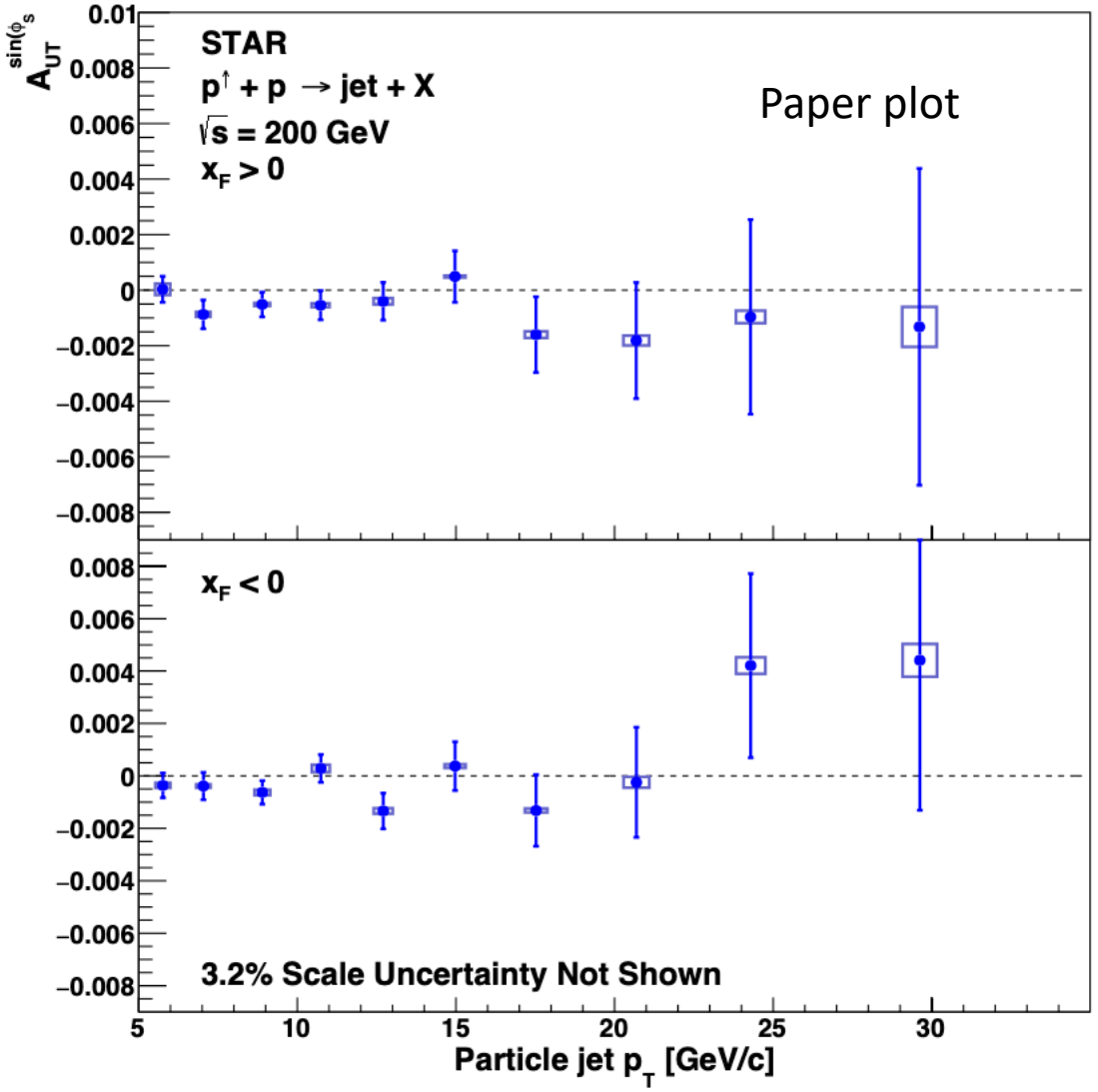


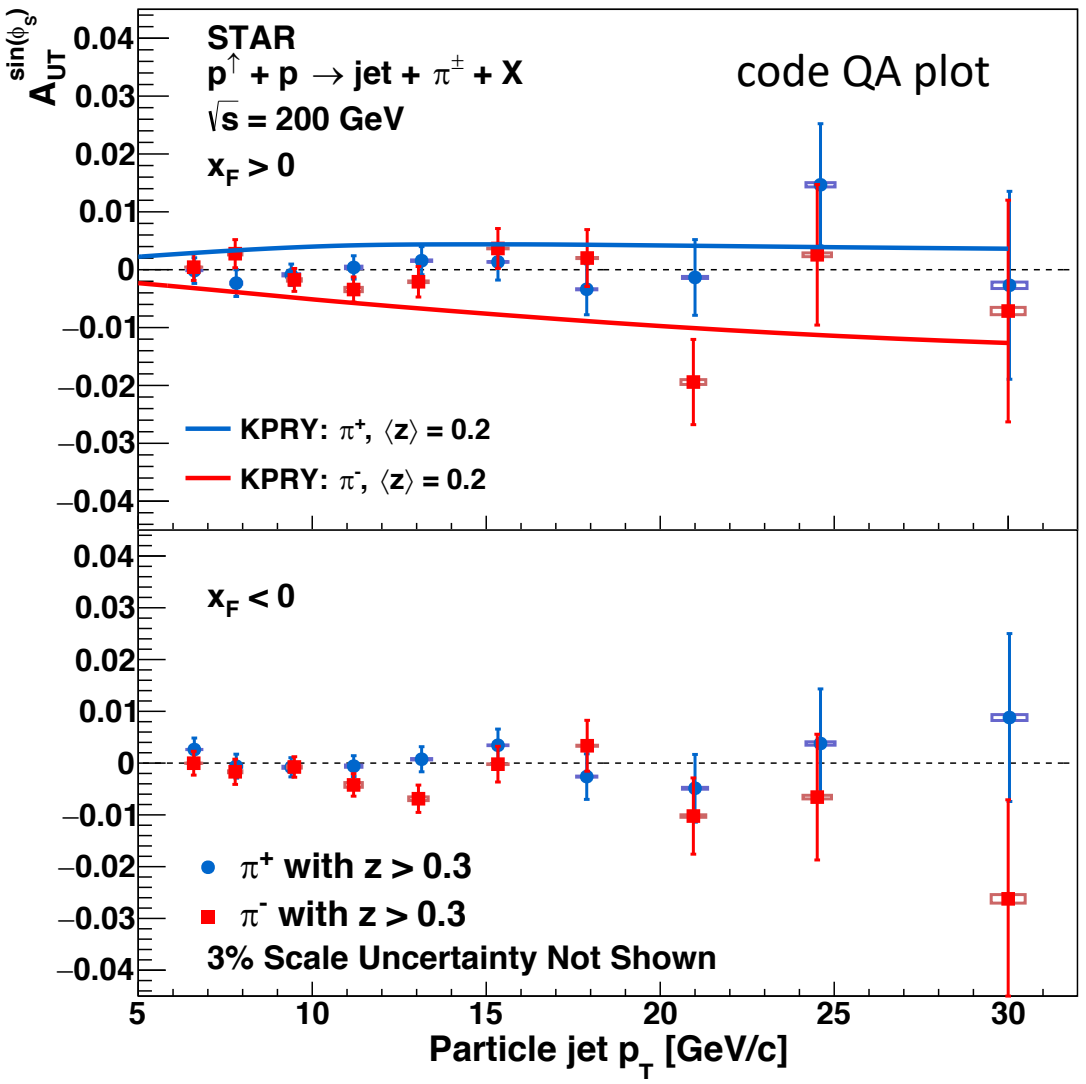
FIG. 9. Distribution of the normalized charged hadron yields as a function of the azimuthal angle of the charged hadrons relative to jet scattering plane, ϕ_H, in 2015 data and simulation. The circle points represent the data, and the shaded bands are the simulation. The size of the color band represents the uncertainties from simulation, and it is smaller than the size of the points for data.

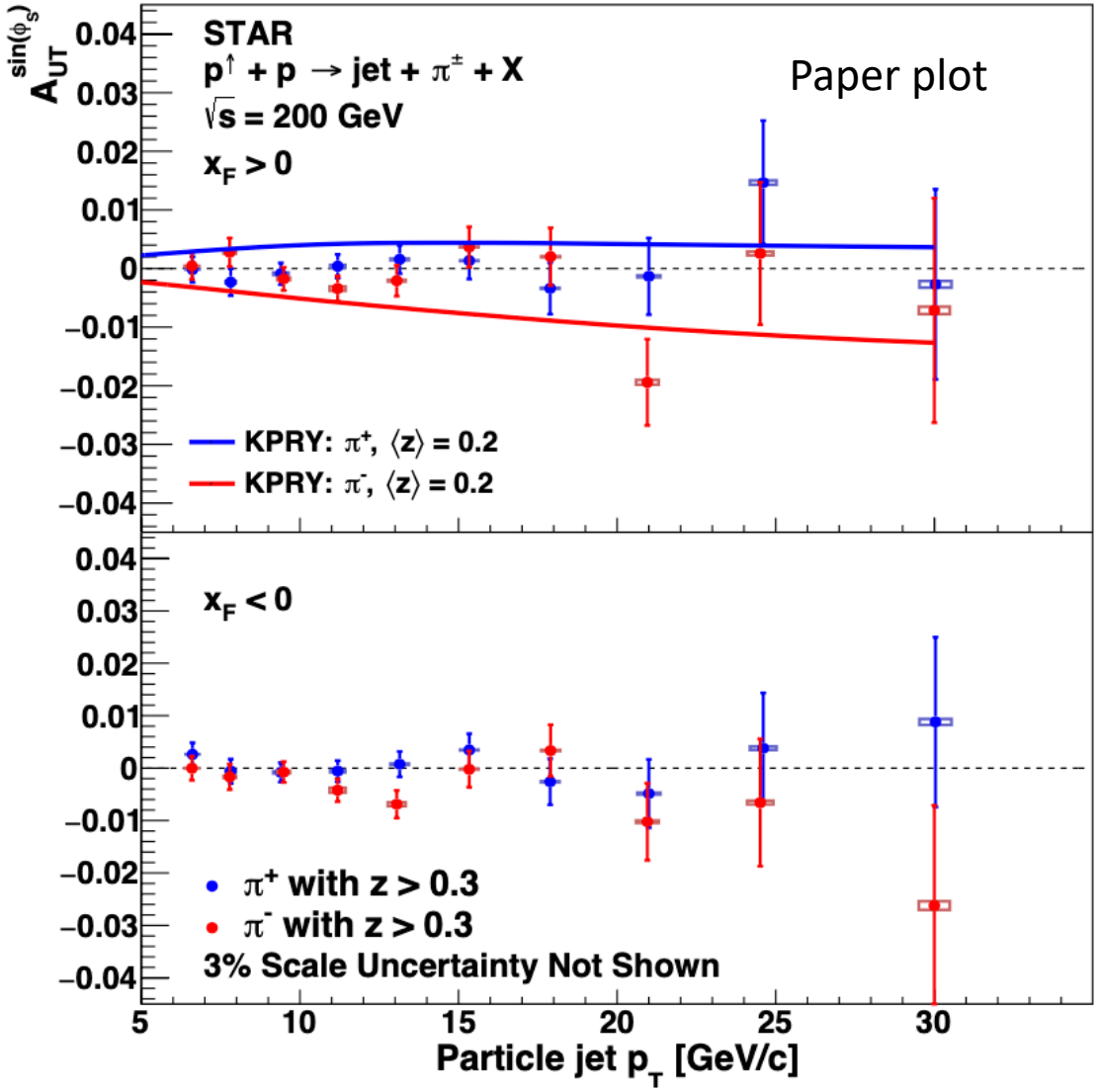
Paper plot Fig. 10



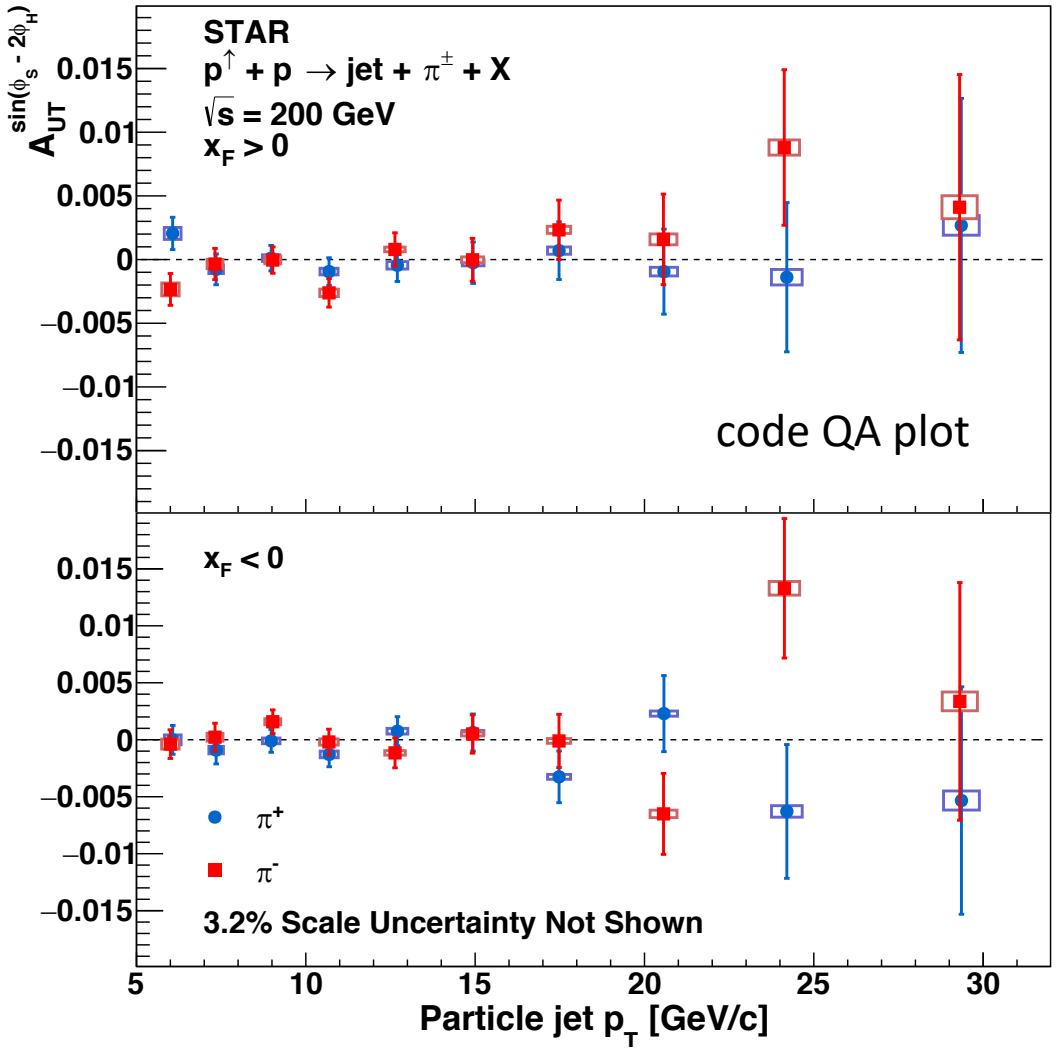


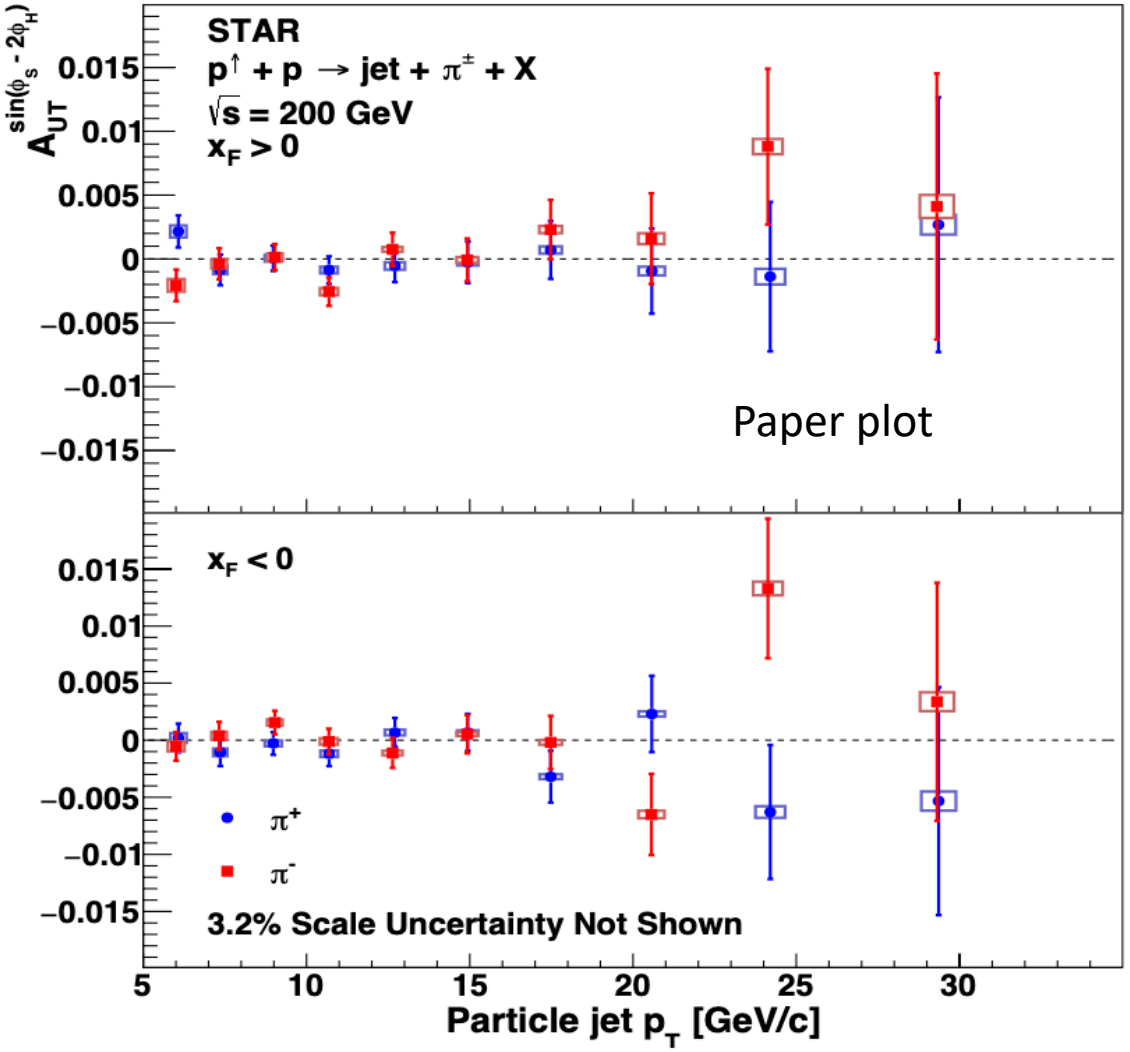
Paper plot Fig. 11





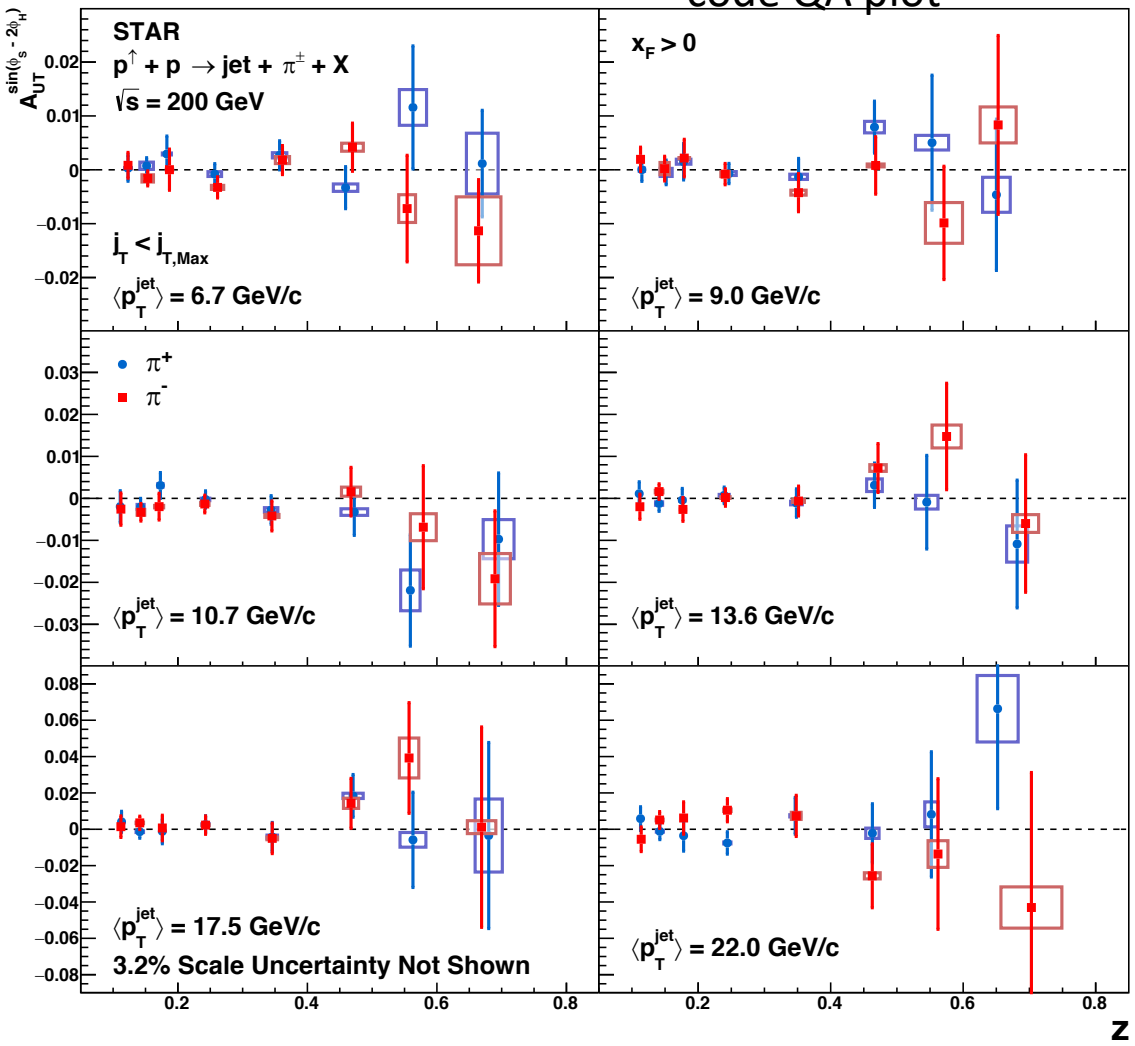
Paper plot Fig. 12



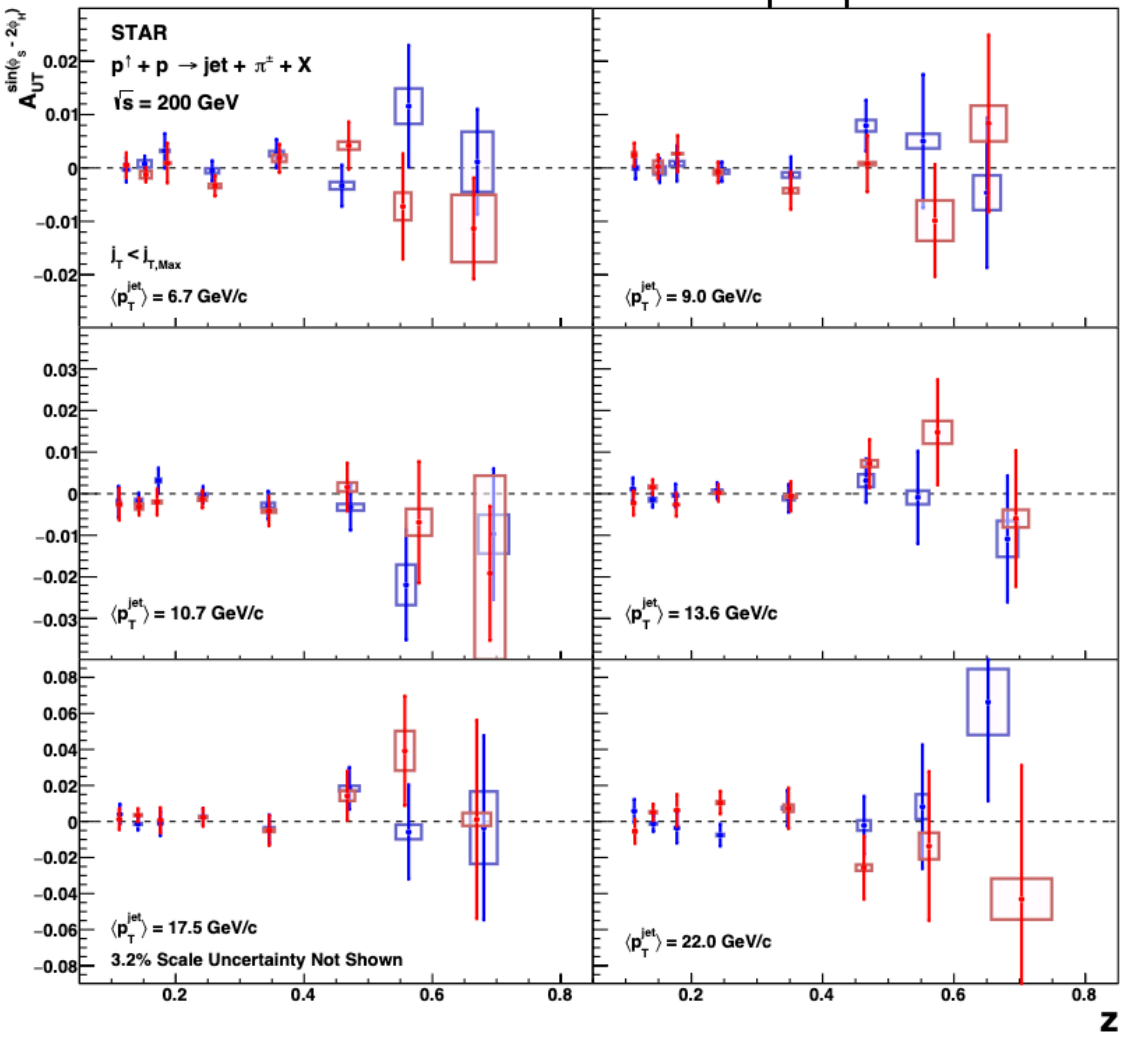


Paper plot Fig. 13

code QA plot

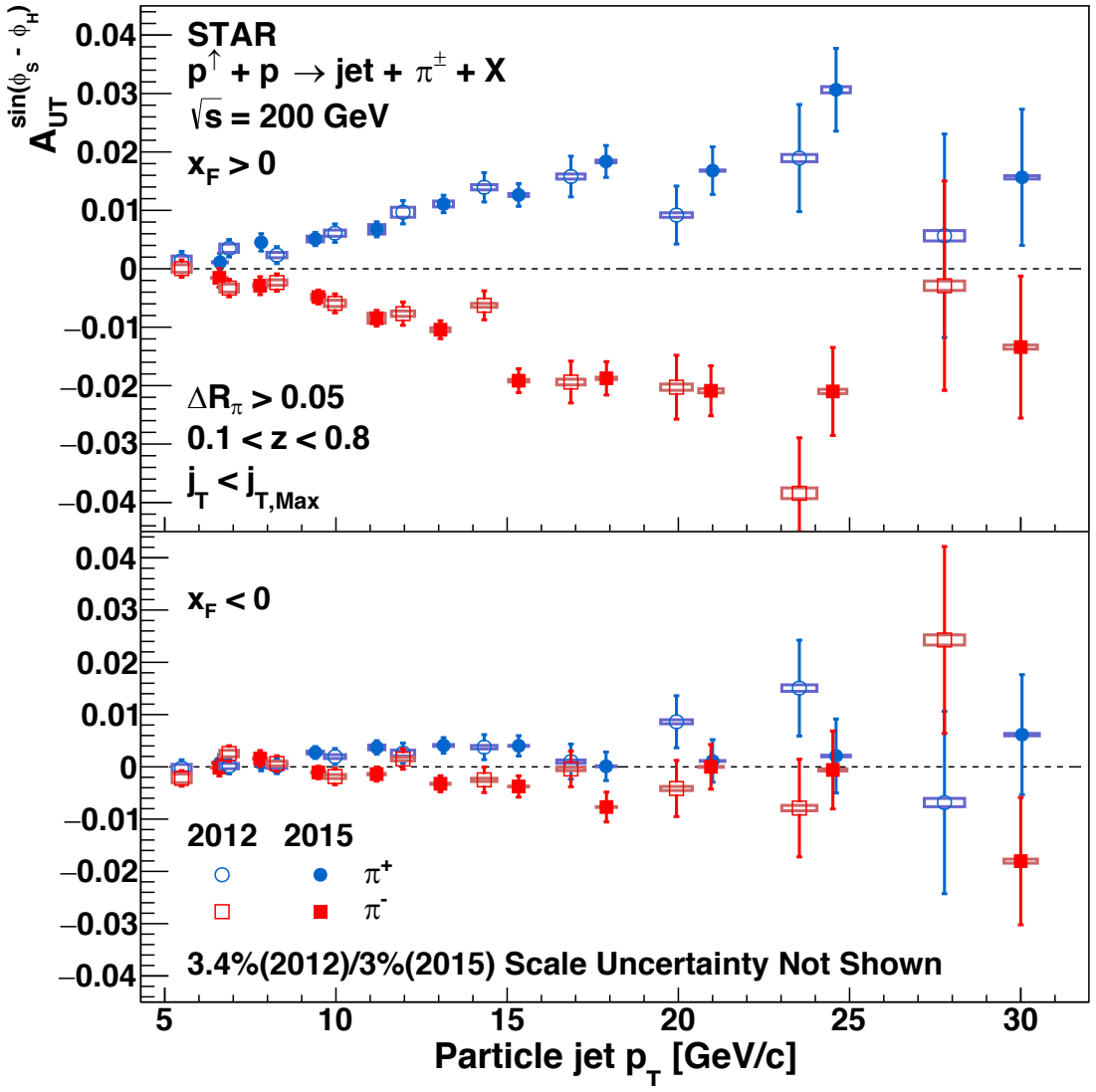


Paper plot

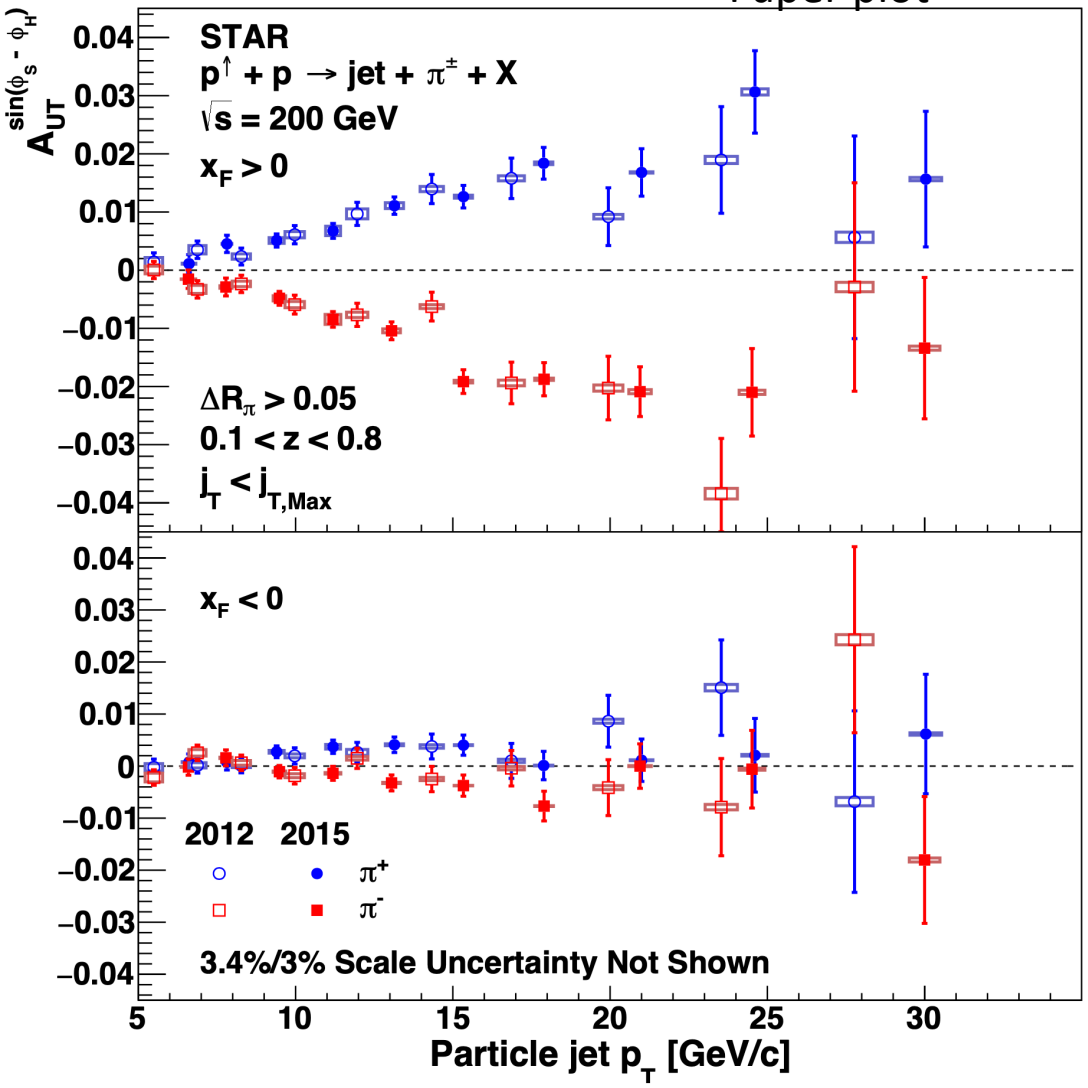


Paper plot Fig. 14

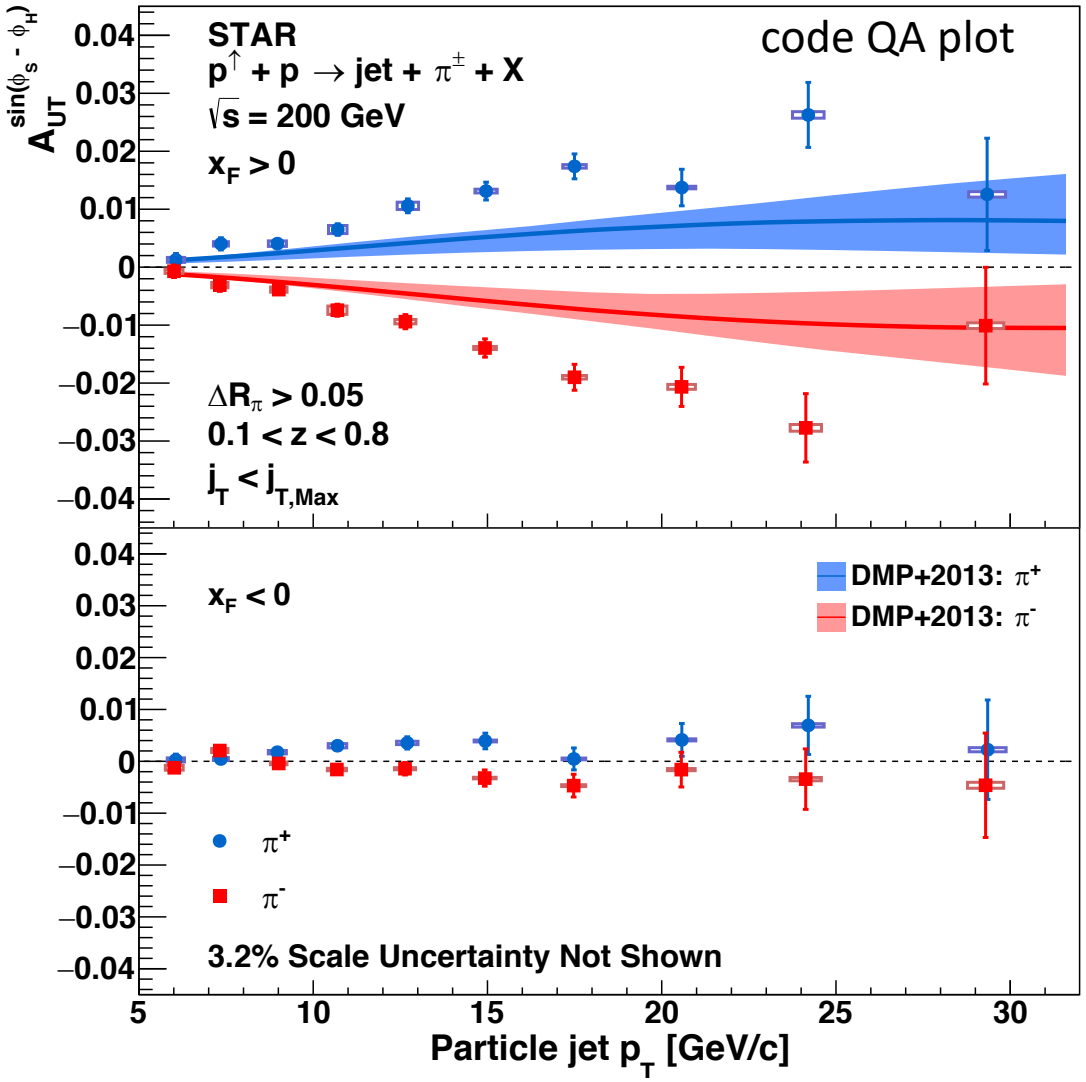
code QA plot

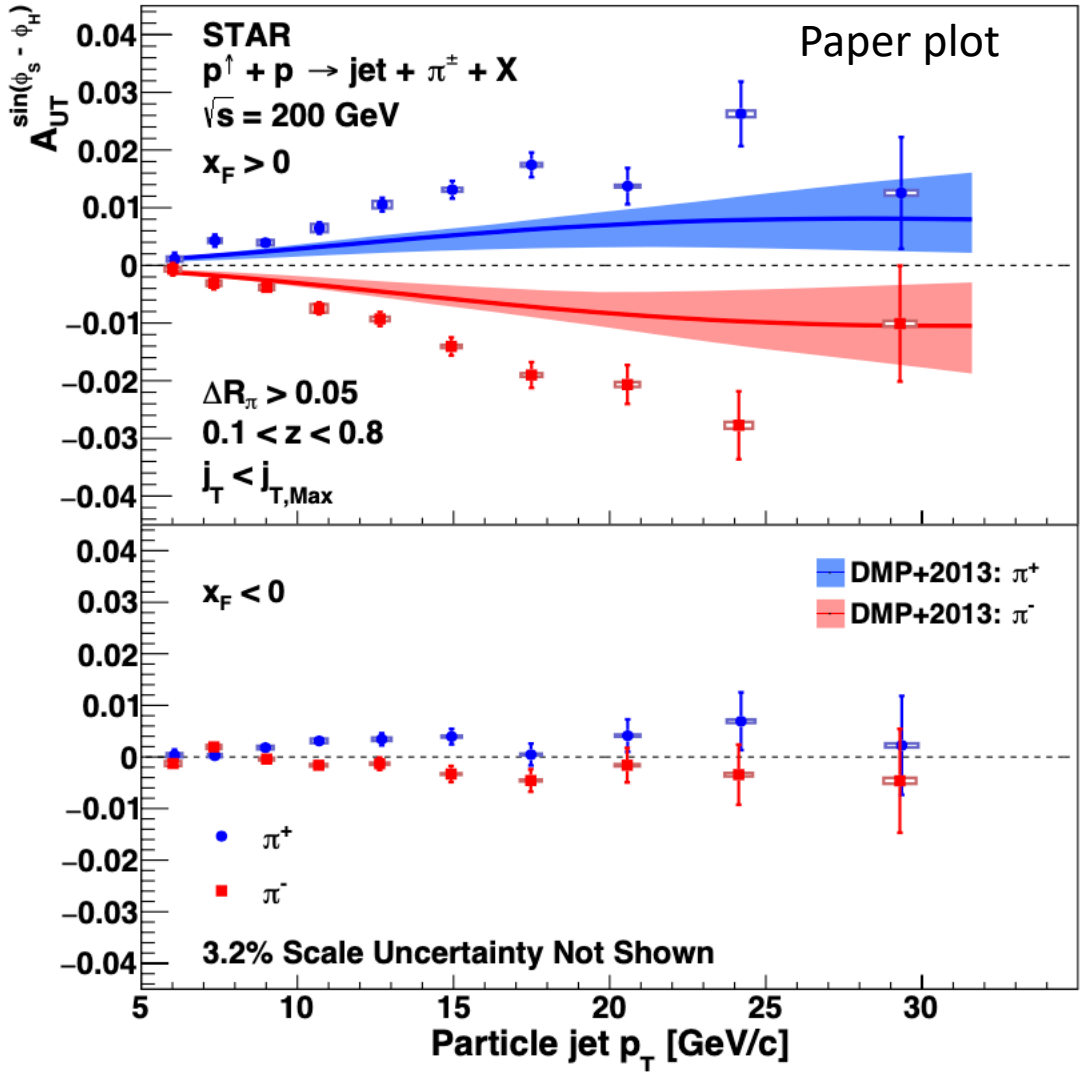


Paper plot



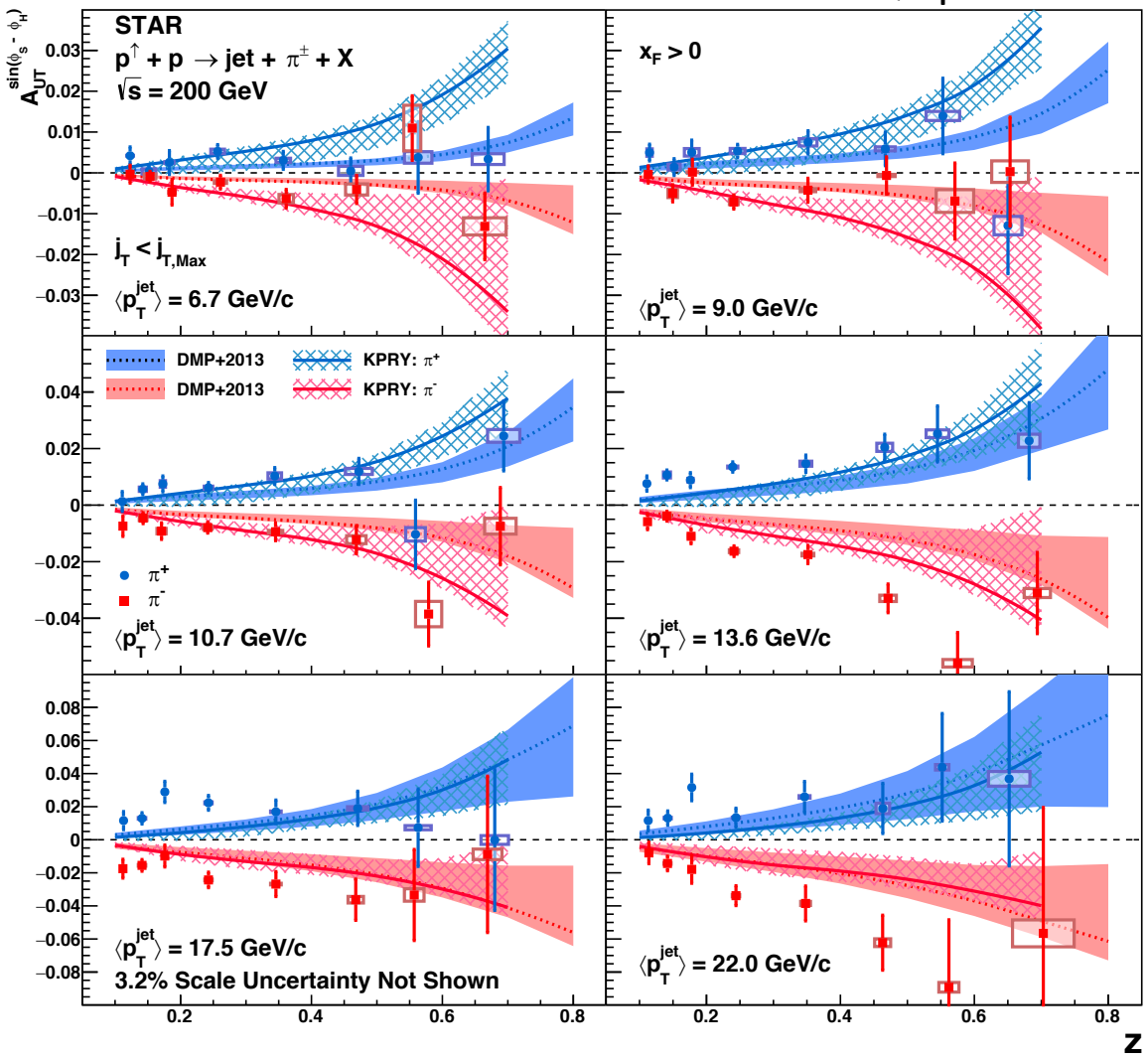
Paper plot Fig. 15



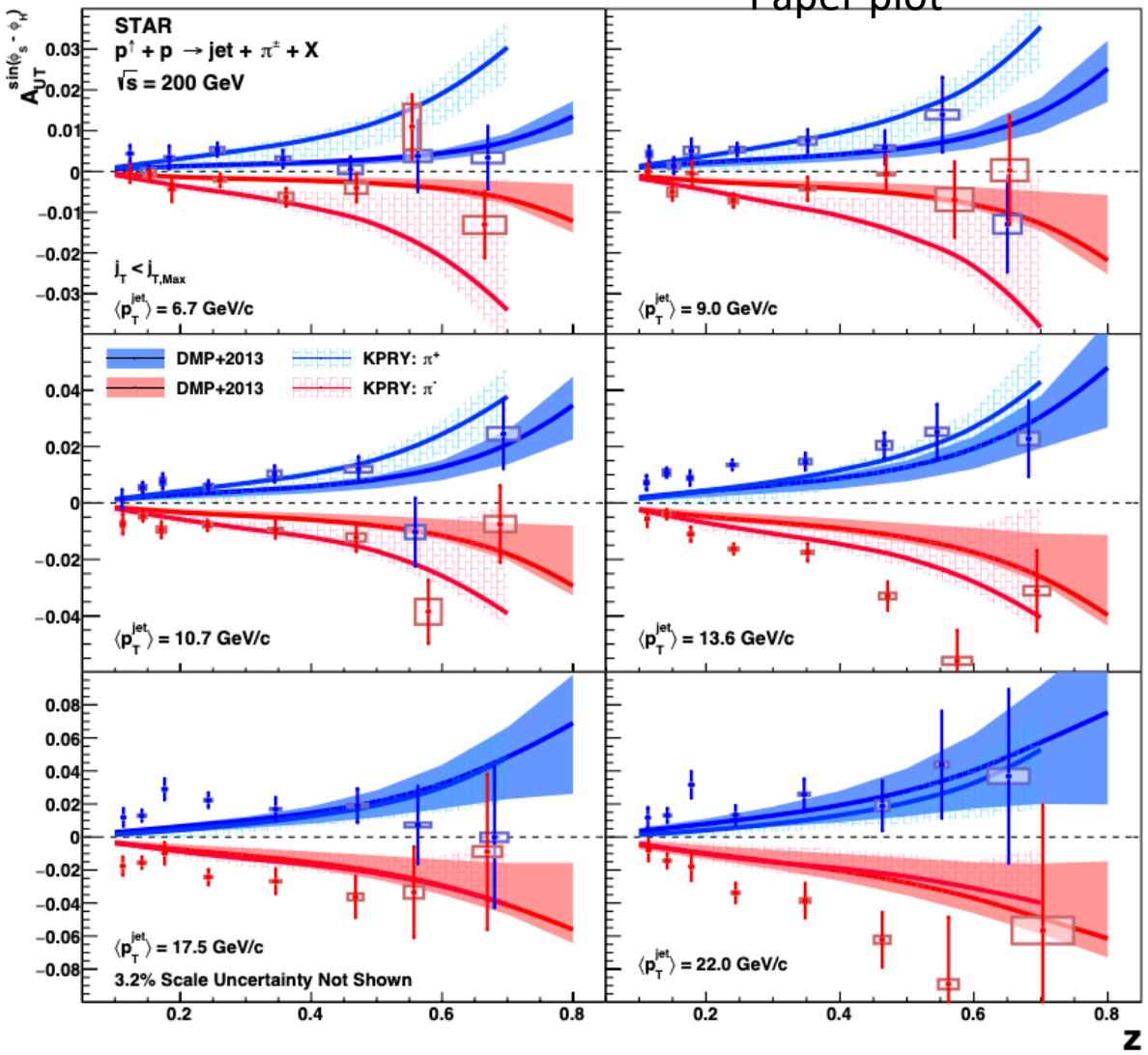


Paper plot Fig. 16

code QA plot

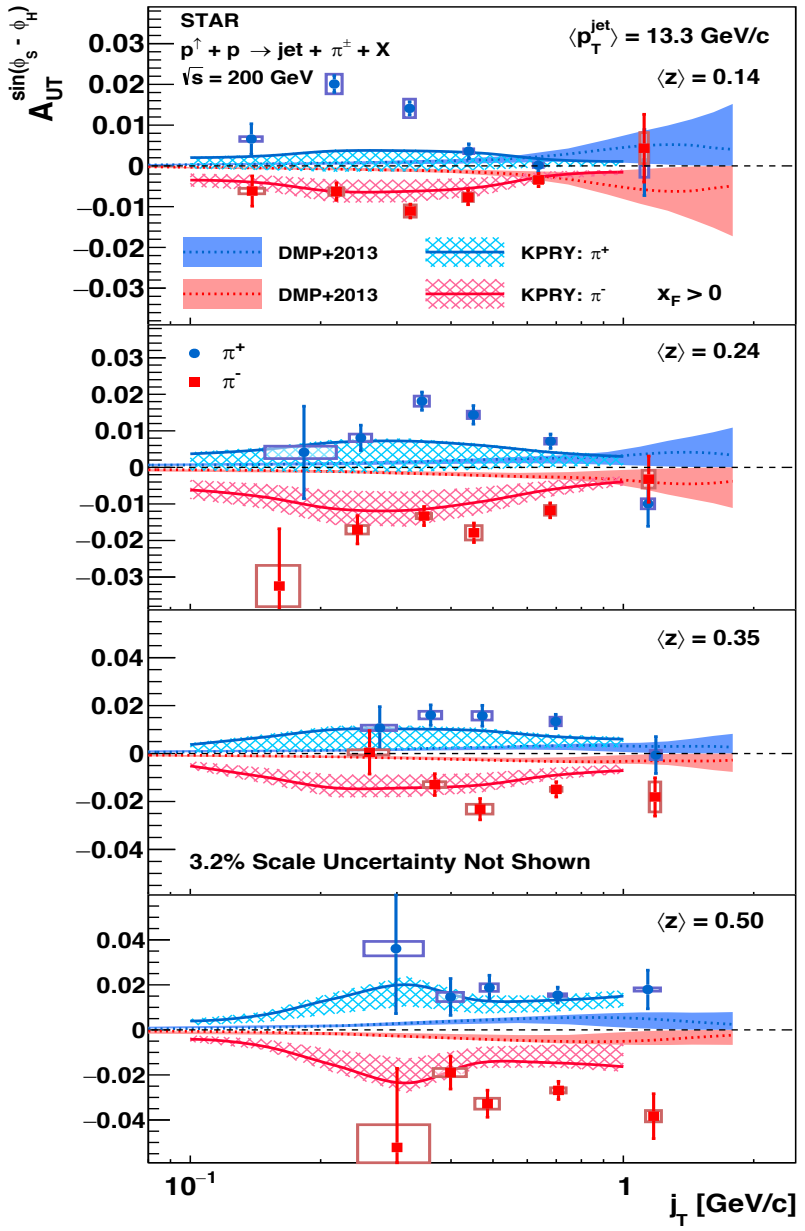


Paper plot

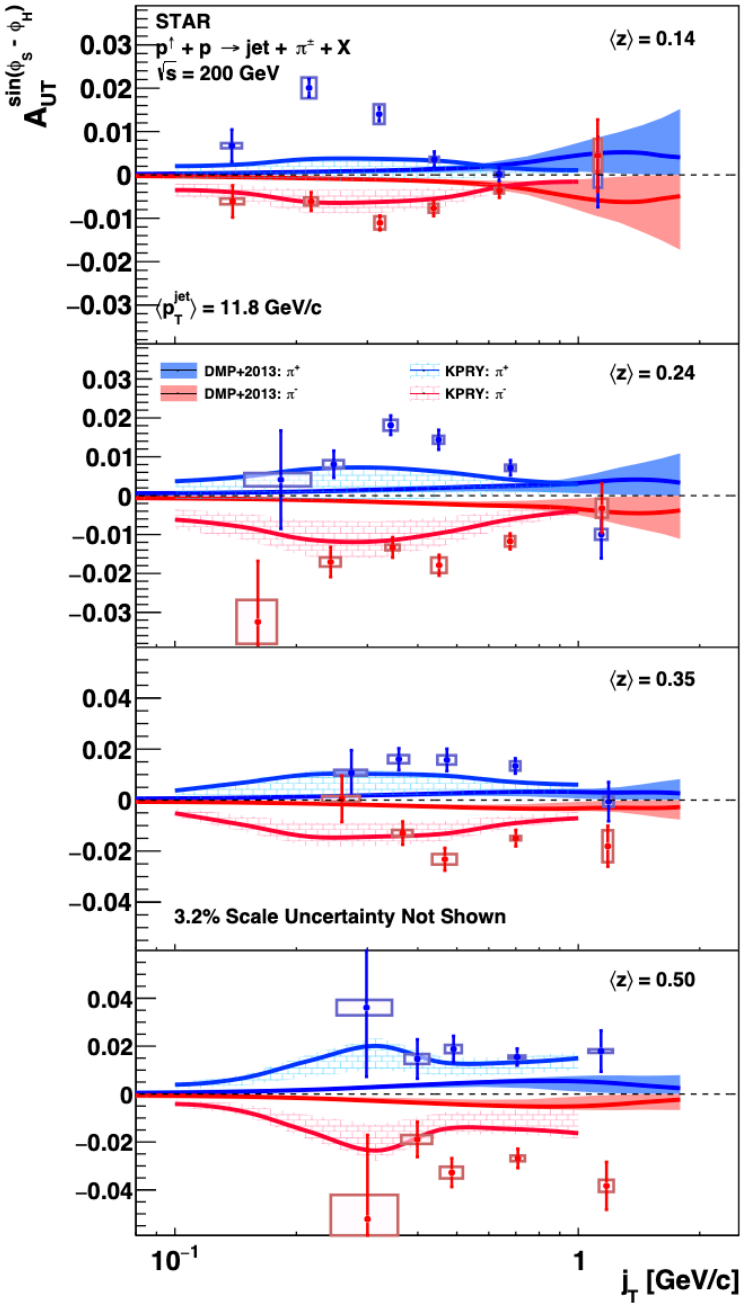


Paper plot Fig. 17

code QA plot

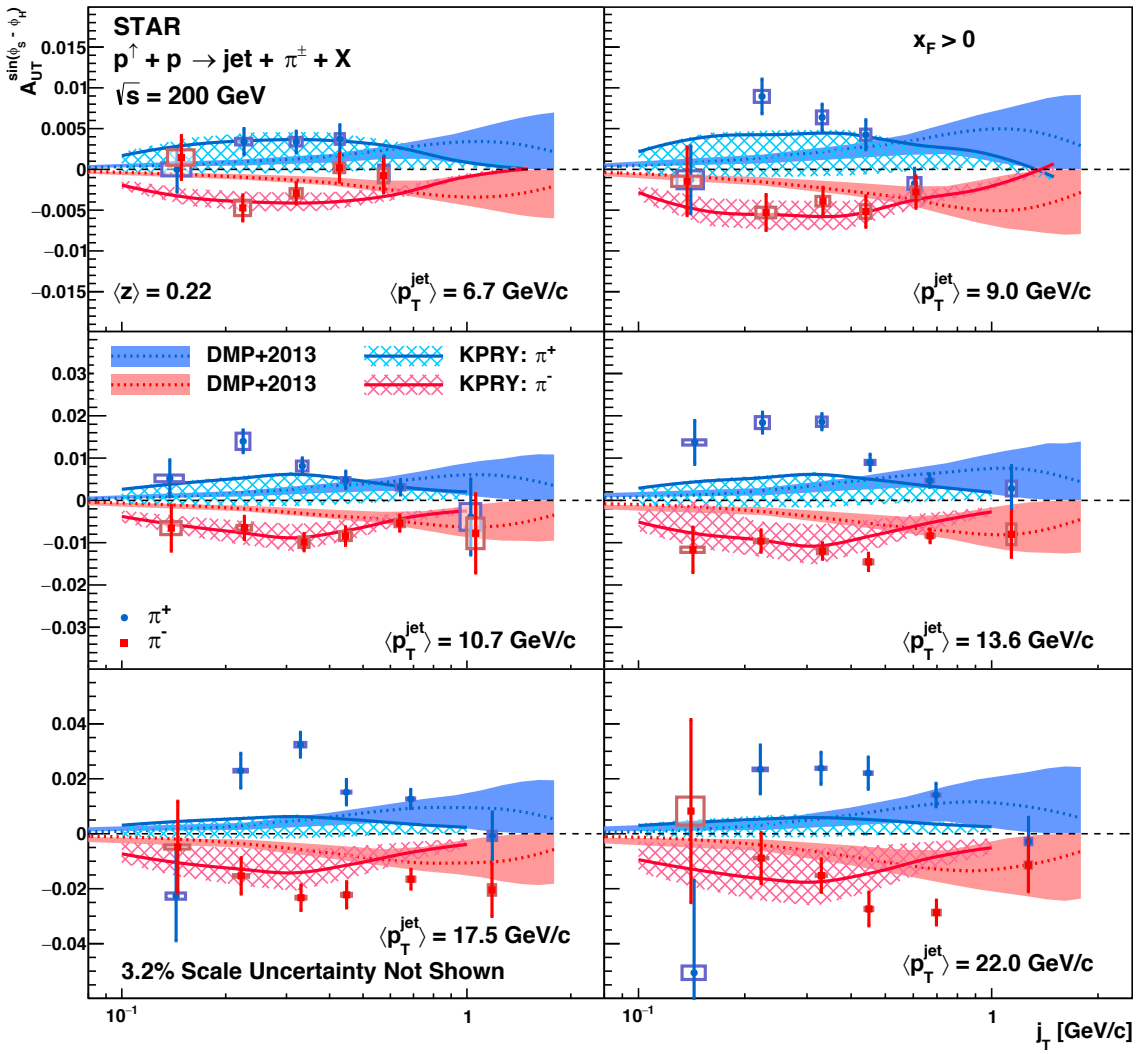


Paper plot

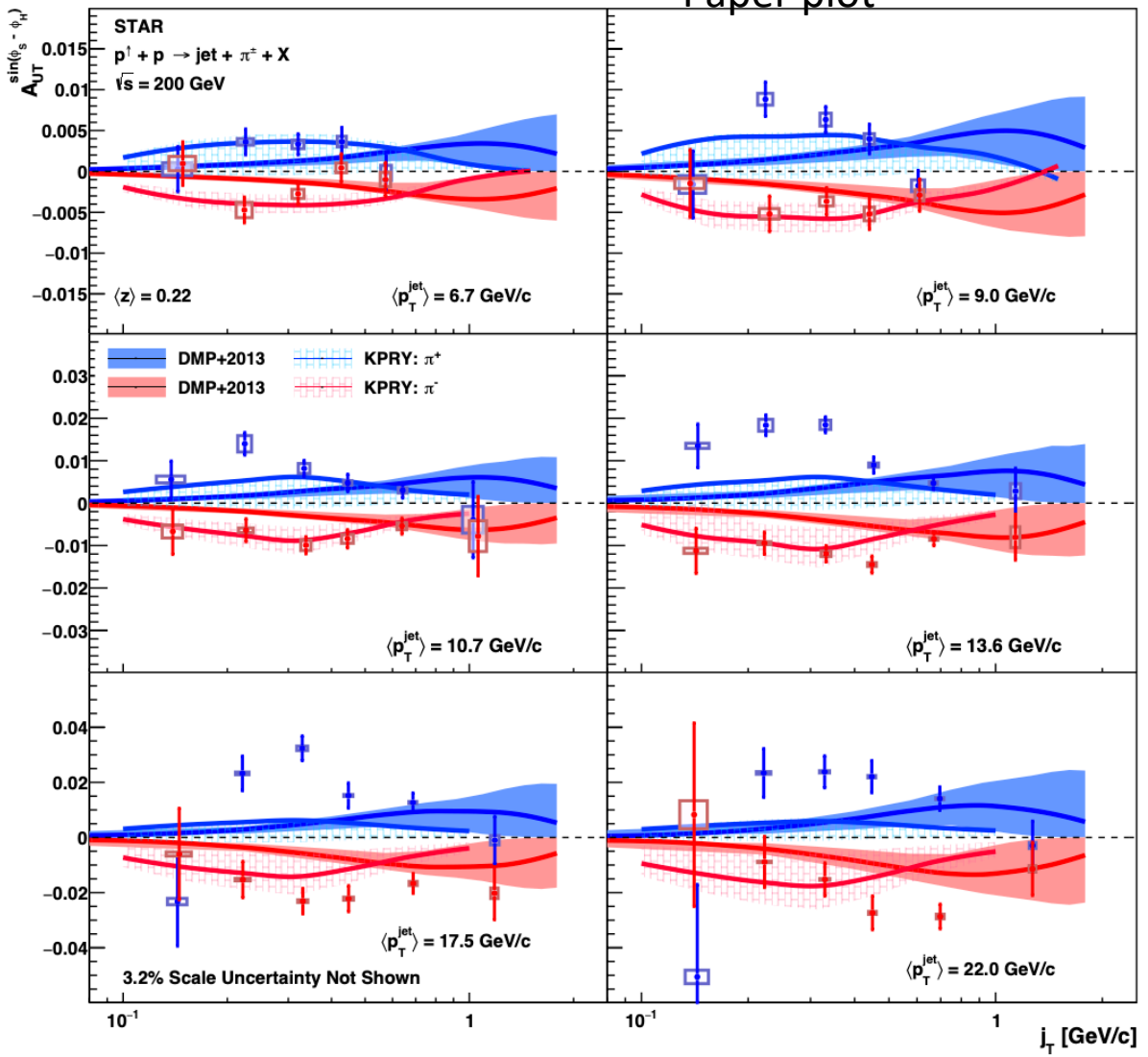


Paper plot Fig. 18

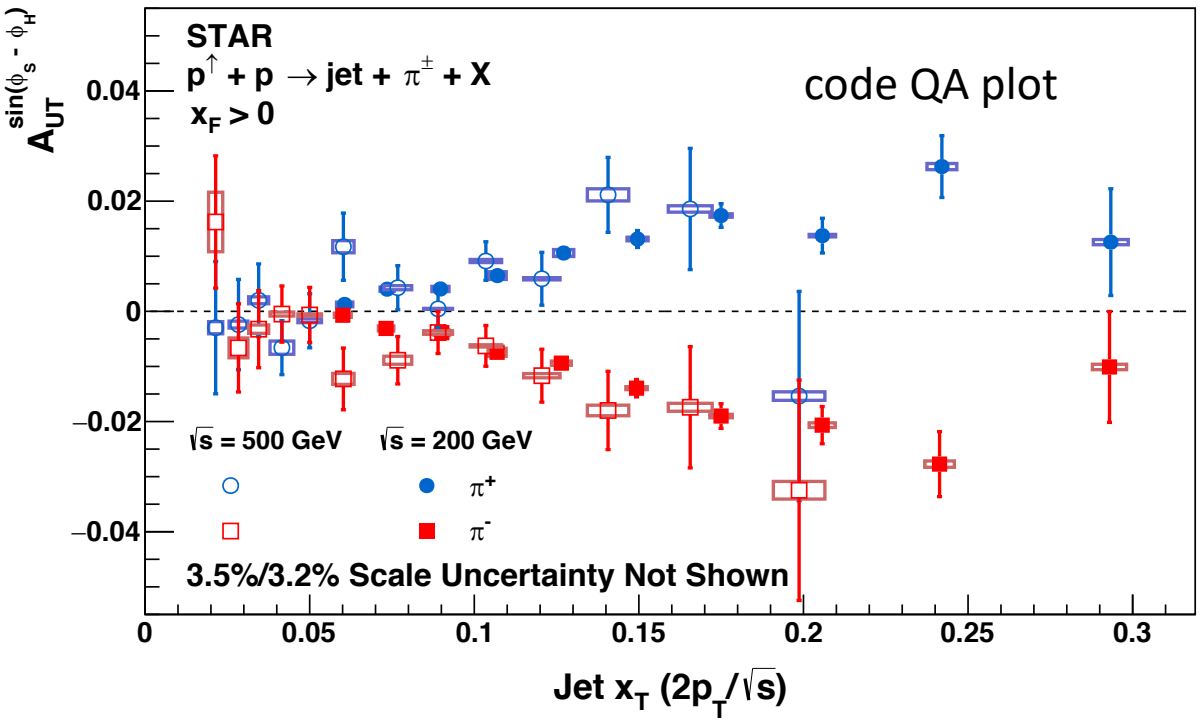
code QA plot

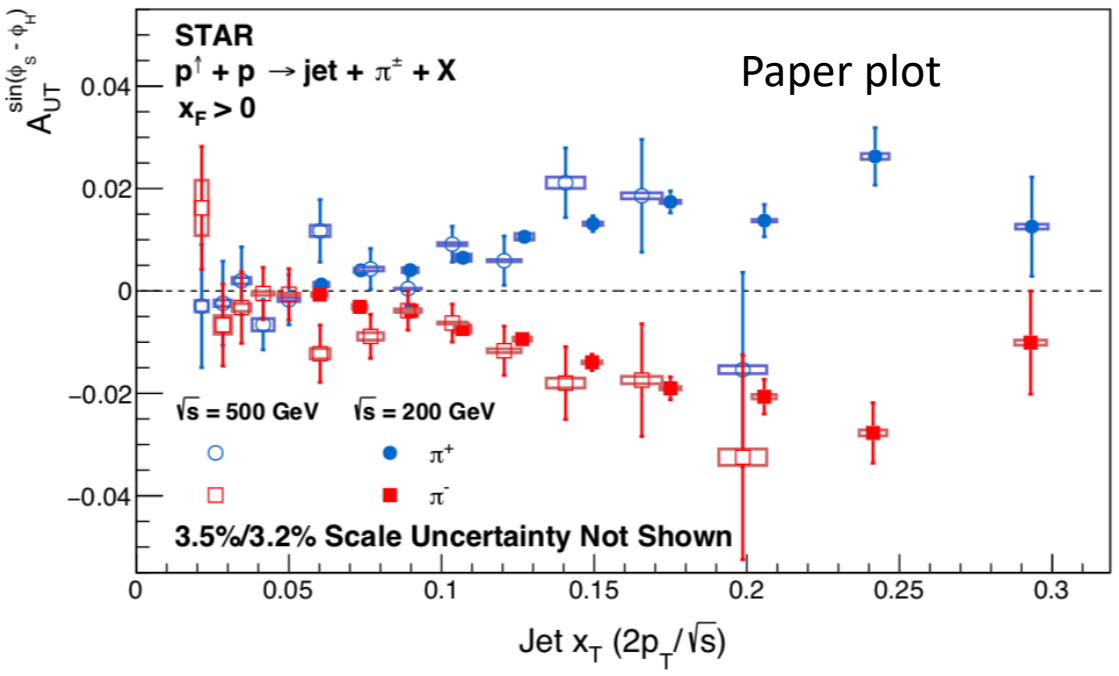


Paper plot



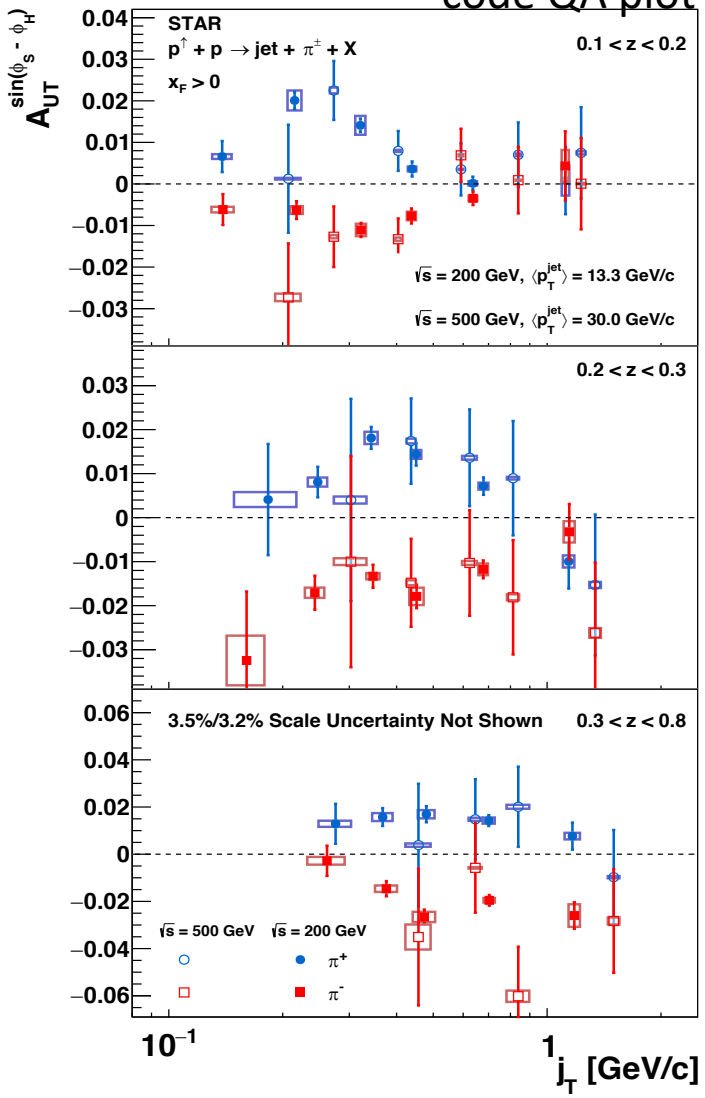
Paper plot Fig. 19



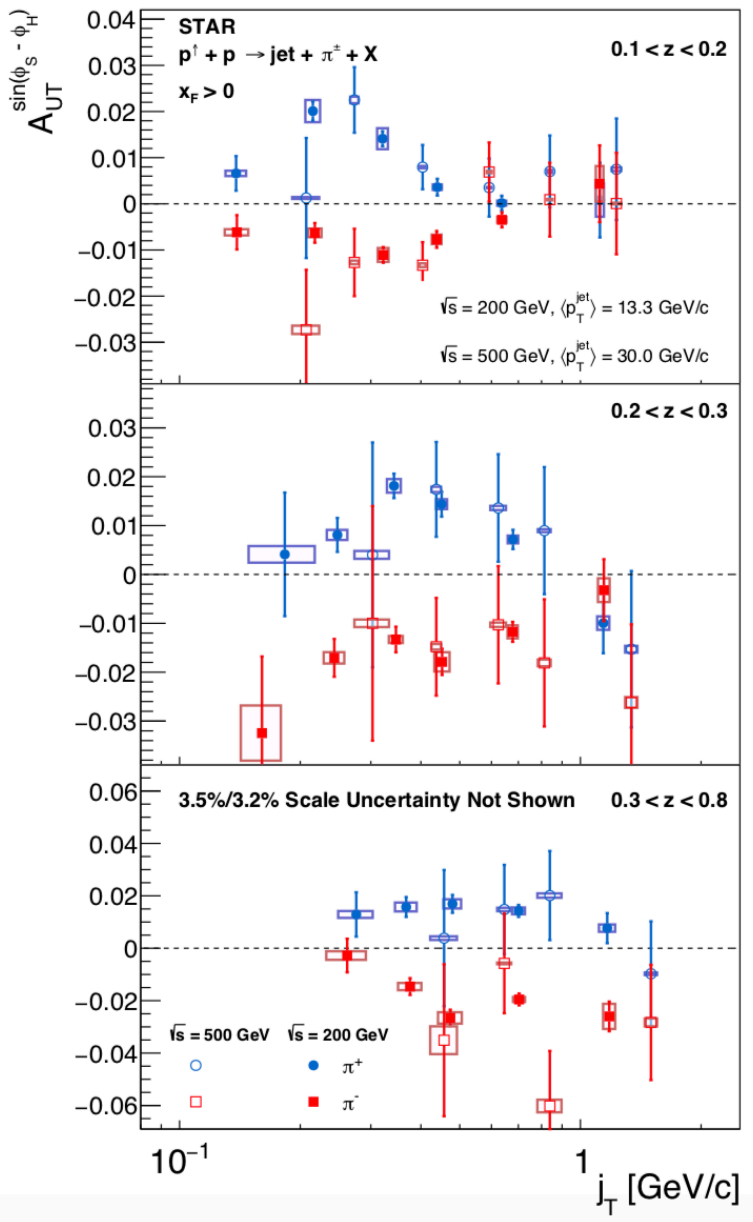


Paper plot Fig. 20

code QA plot

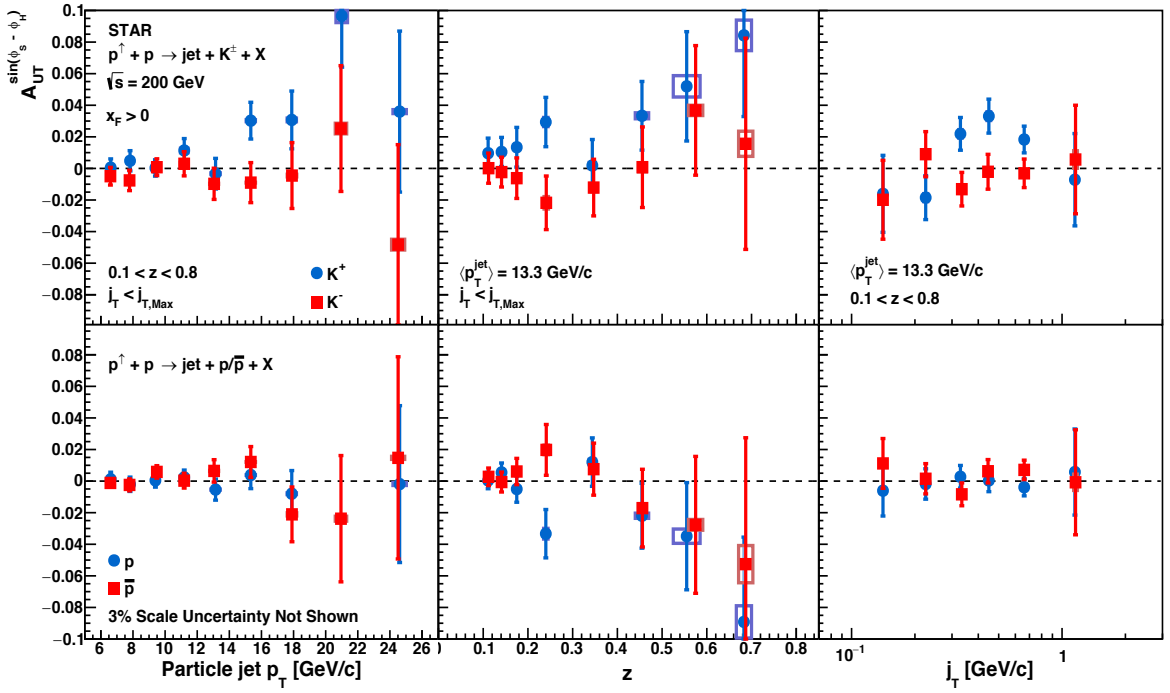


Paper plot

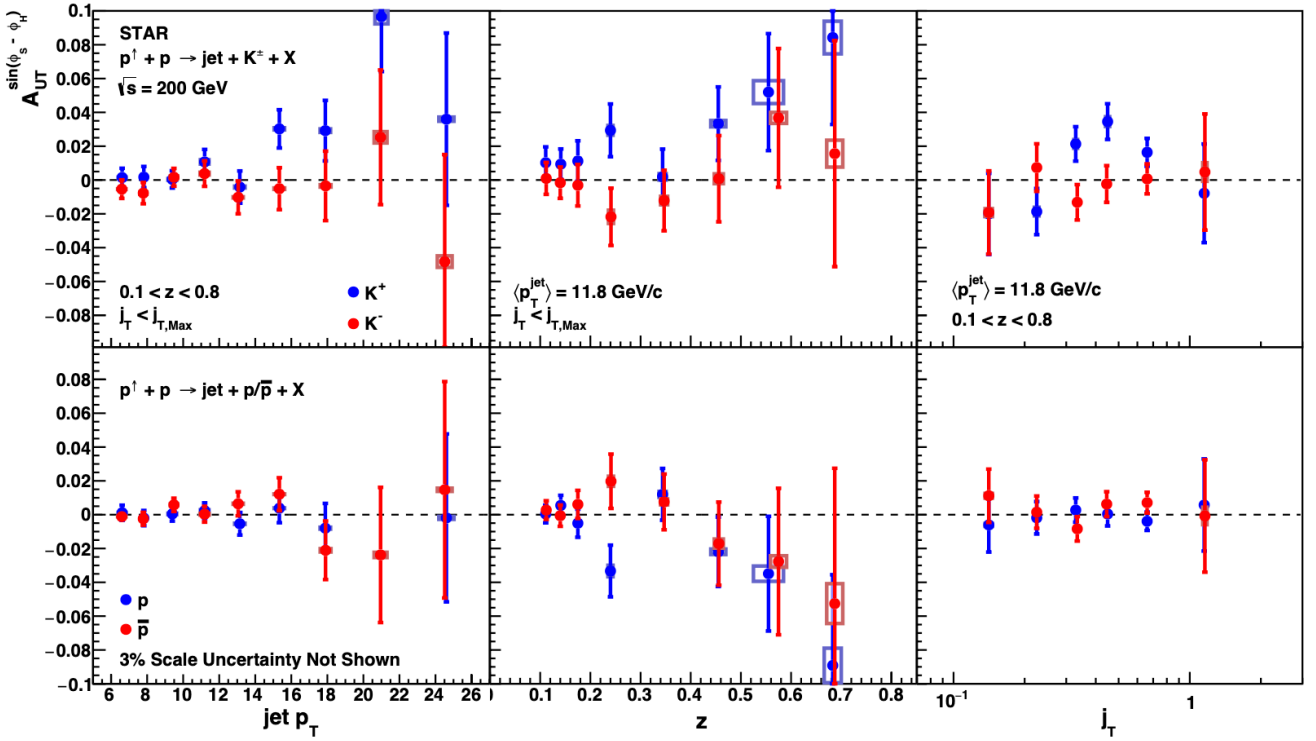


Paper plot Fig. 21

code QA plot



Paper plot



Back up

Run 15 jet tree check for data

- MuDst file example: st_physics_16065016_raw_4500026.MuDst.root
- Use RunJetFinder2015pro.C macro to generate jet tree.
- Some difference for jet tree (.jets.root) ?