

other transverse spin measurements at 200 GeV

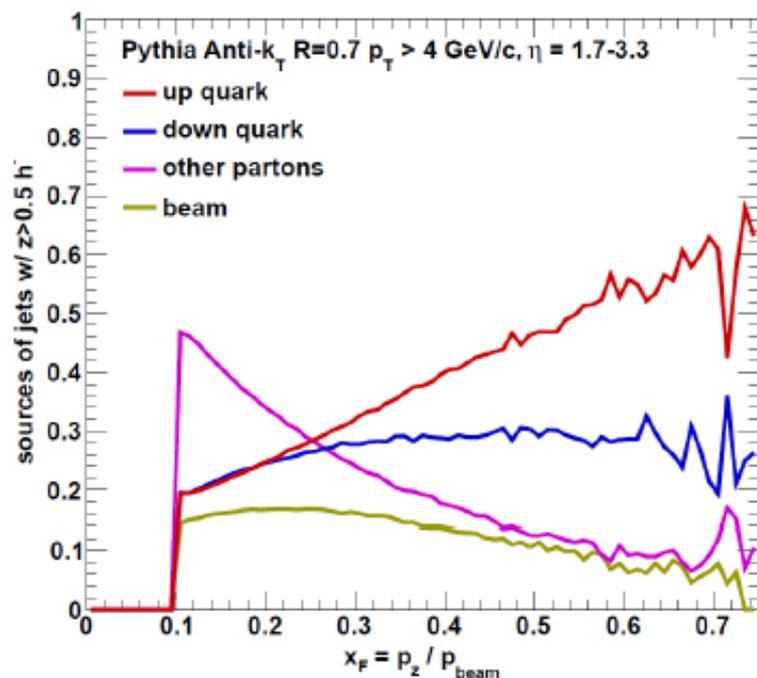
Update 10/11

Ralf Seidl

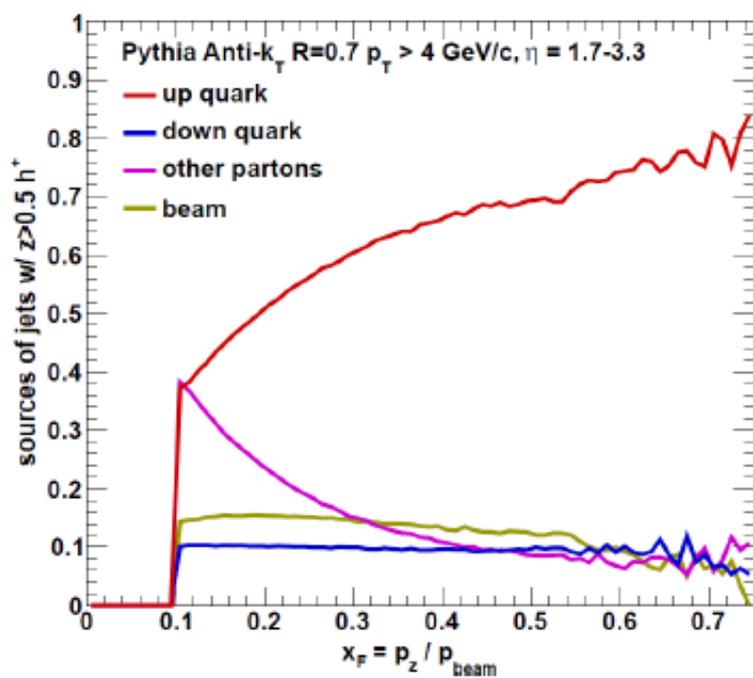
(RIKEN)

Separating Jet Sources

Jets with negative hadron $z > 0.5$



Jets with positive hadron $z > 0.5$



Jets from standard PYTHIA Tune A, beam remnants from Tune A with $k_T=0.36$.

A cut on the charge of the leading hadron changes the composition of the jet sample.

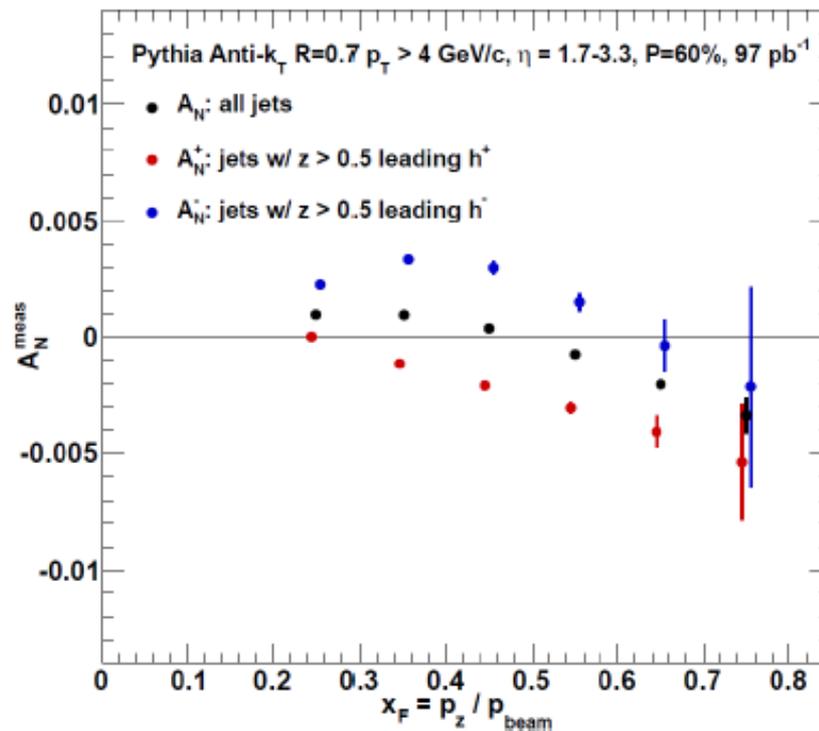
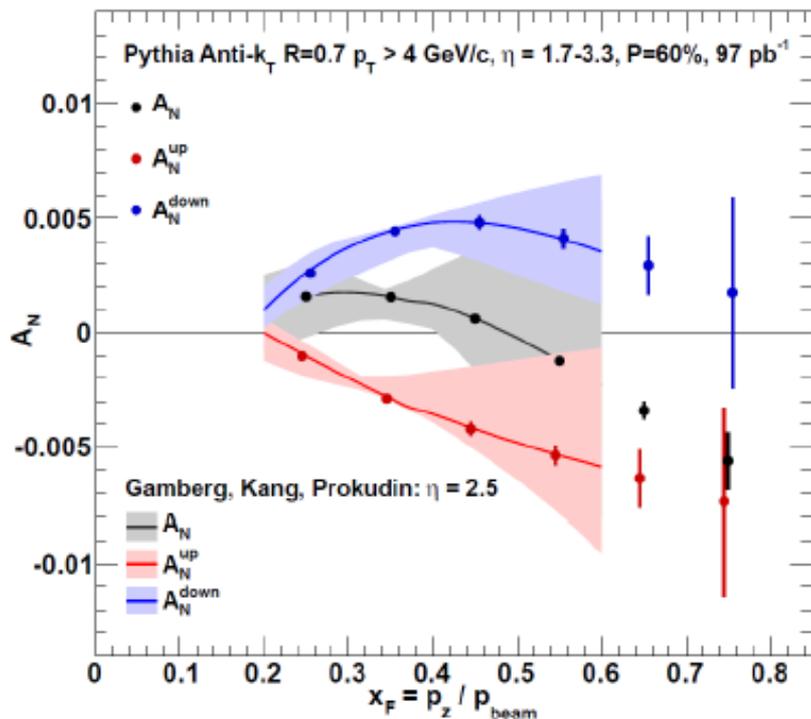


Jet Measurements II

This theoretical extraction implies



We would measure asymmetries like:



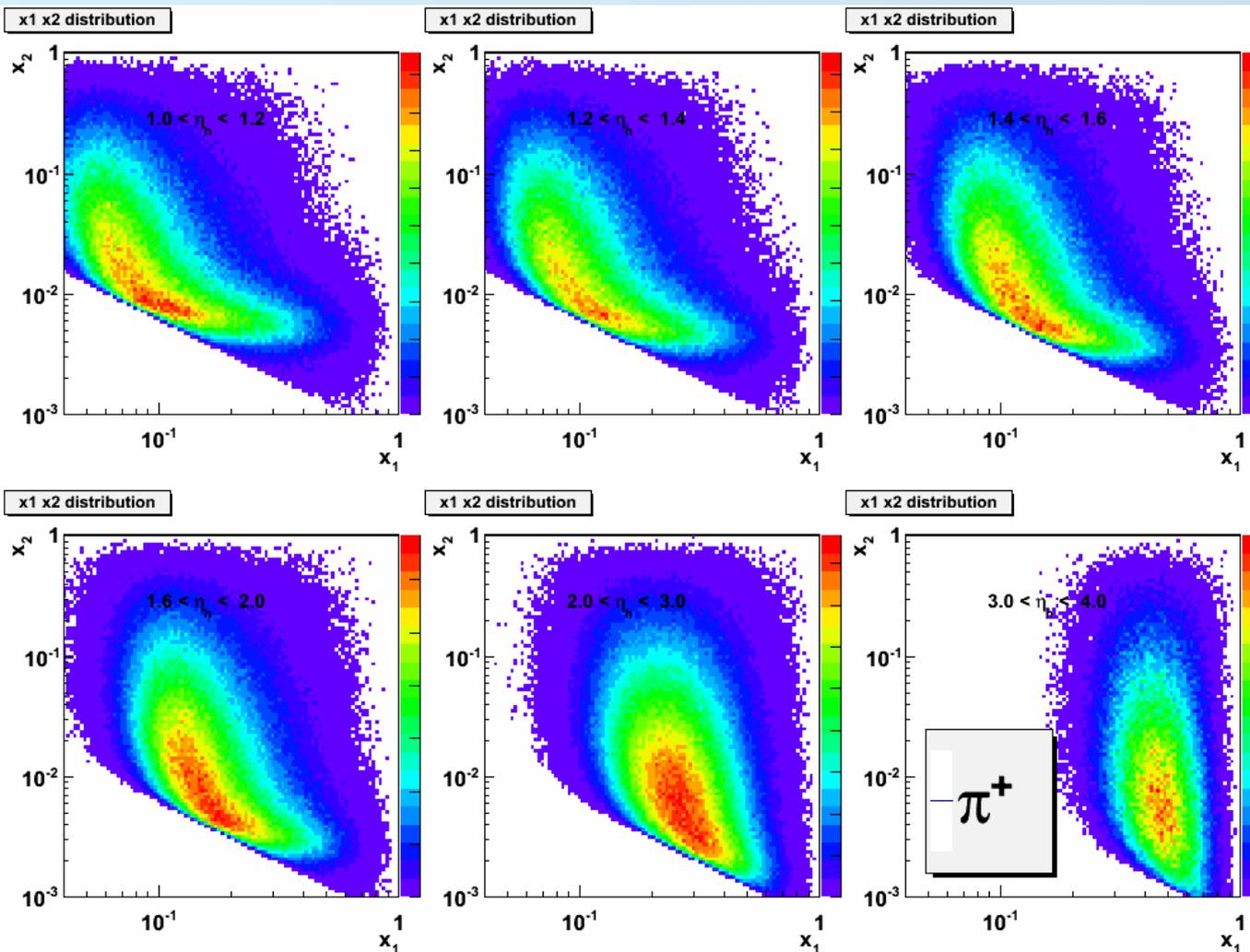
Gamberg, Kang and Prokudin: *Phys Rev. Lett.* 110:232301 (2013)

Stat. error bars and composition from Pythia.

Projected stat. error bars with ~ 100 pb $^{-1}$ compared to theoretical model.

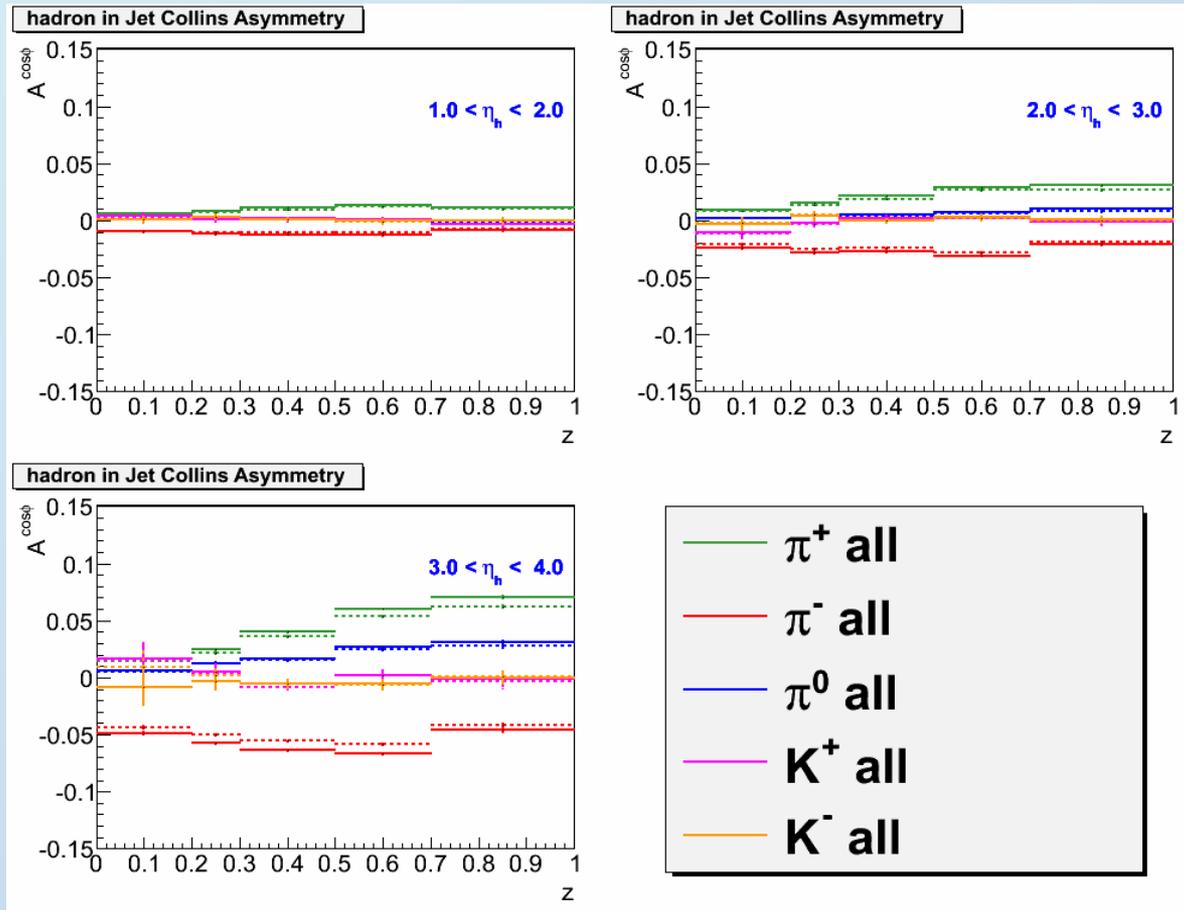


x1 x2 ranges in rapidity slices



Baseline for
TTPMC:
200 GeV pp
Hard light
processes ($\text{ckin} > 1\text{GeV}$),
Hadrons in 1-4
rapidity range
with $P_t > 1\text{GeV}$

Expected Collins asymmetries

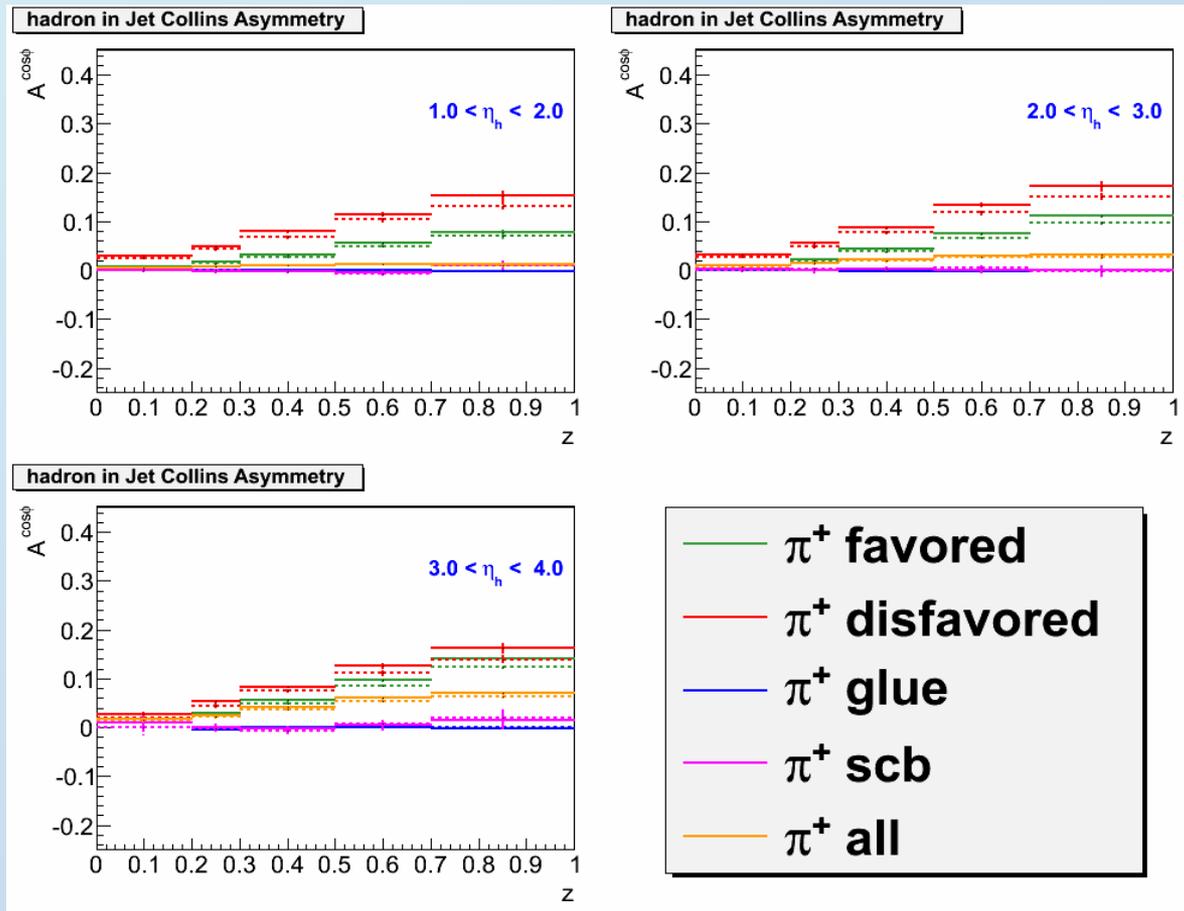


Summary and Outlook

- Jet asymmetry enhancement via hadron selection; requires at least hadronic calorimetry and tracking
- Forward Collins (hadrons in jets) interesting for intermediate to higher x at reasonable scale; requires hadronic calorimetry, tracking and better also hadron id
- Other incremental measurements:
 - Higher direct photon AN statistics (maybe useful)
 - More (di)jet ALLs?

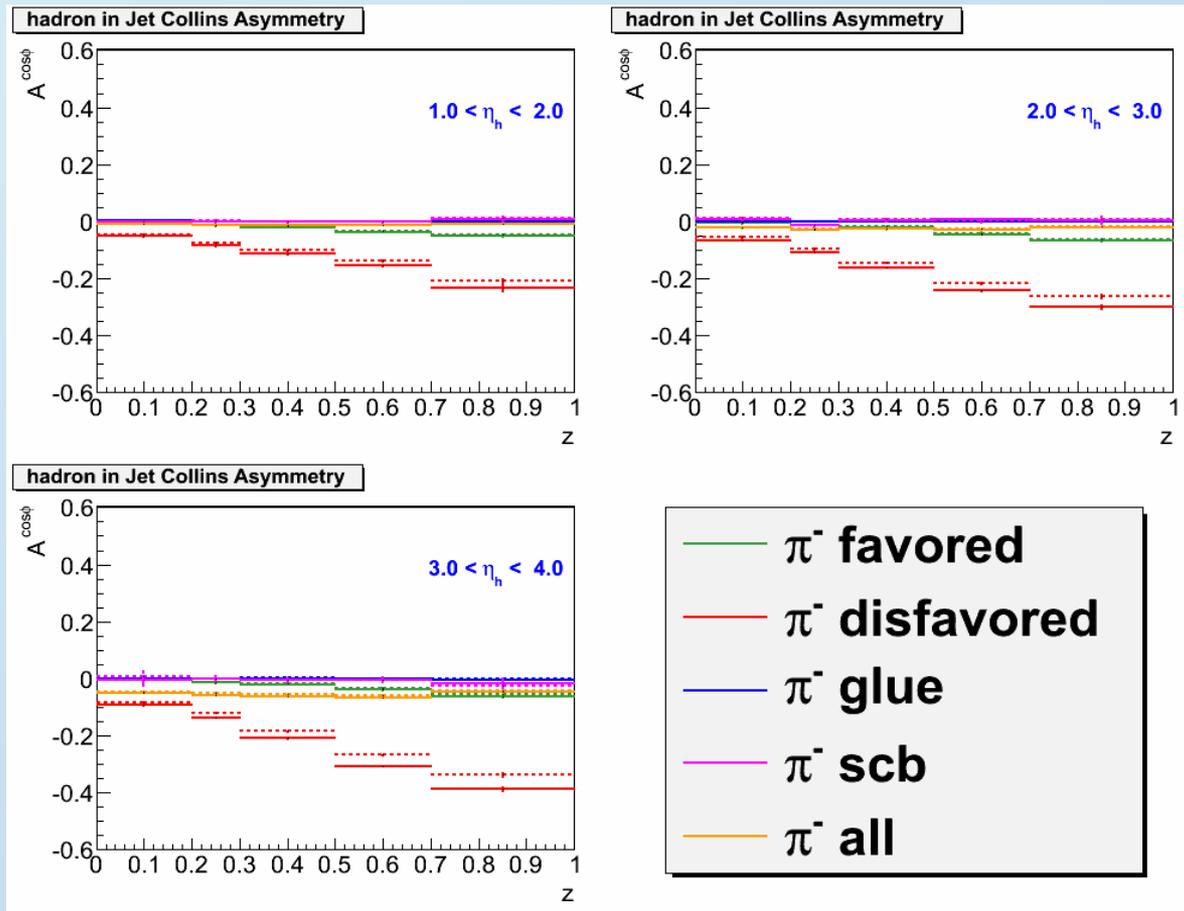
Backup

Collins π^+

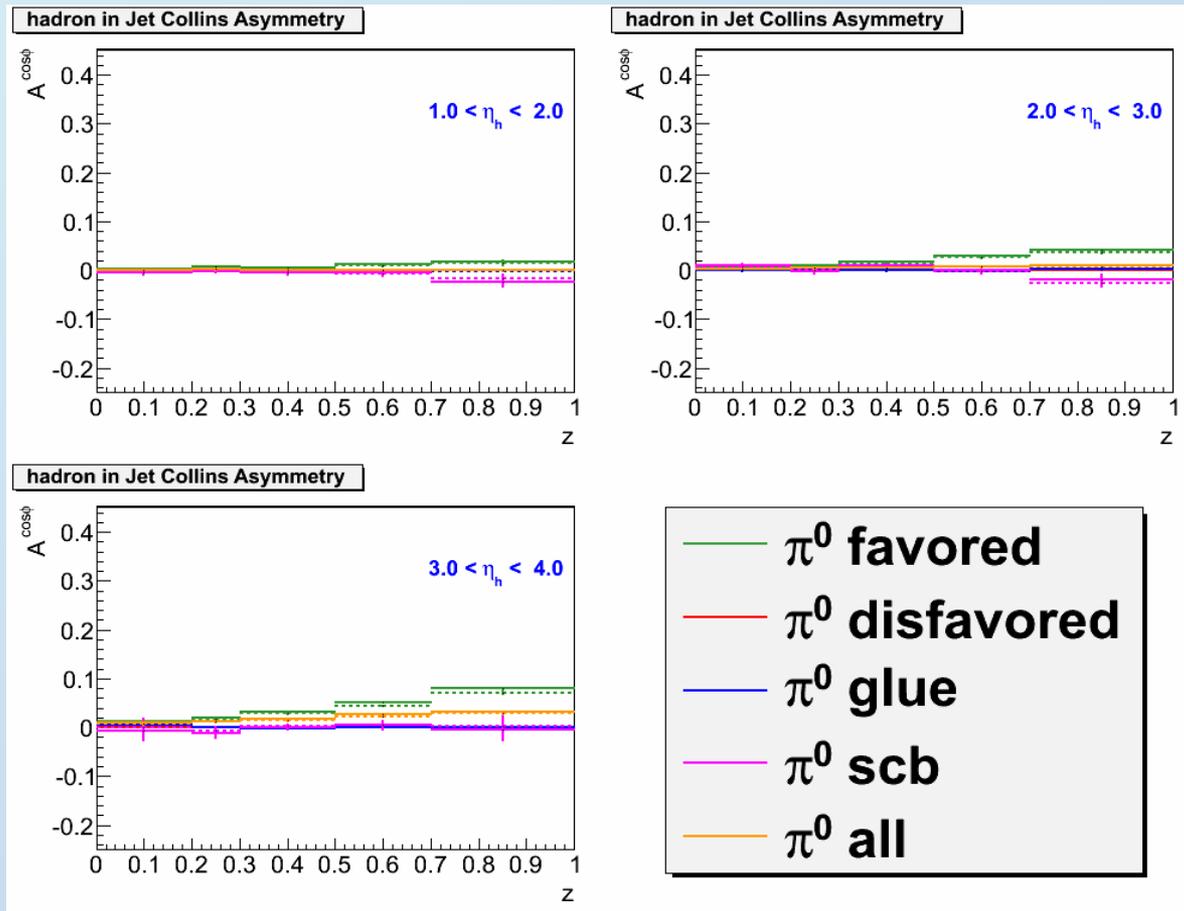


As transversities for u and d quarks are opposite, the Collins asymmetries for π^+ and π^0 are of the same sign.

Collins pi-

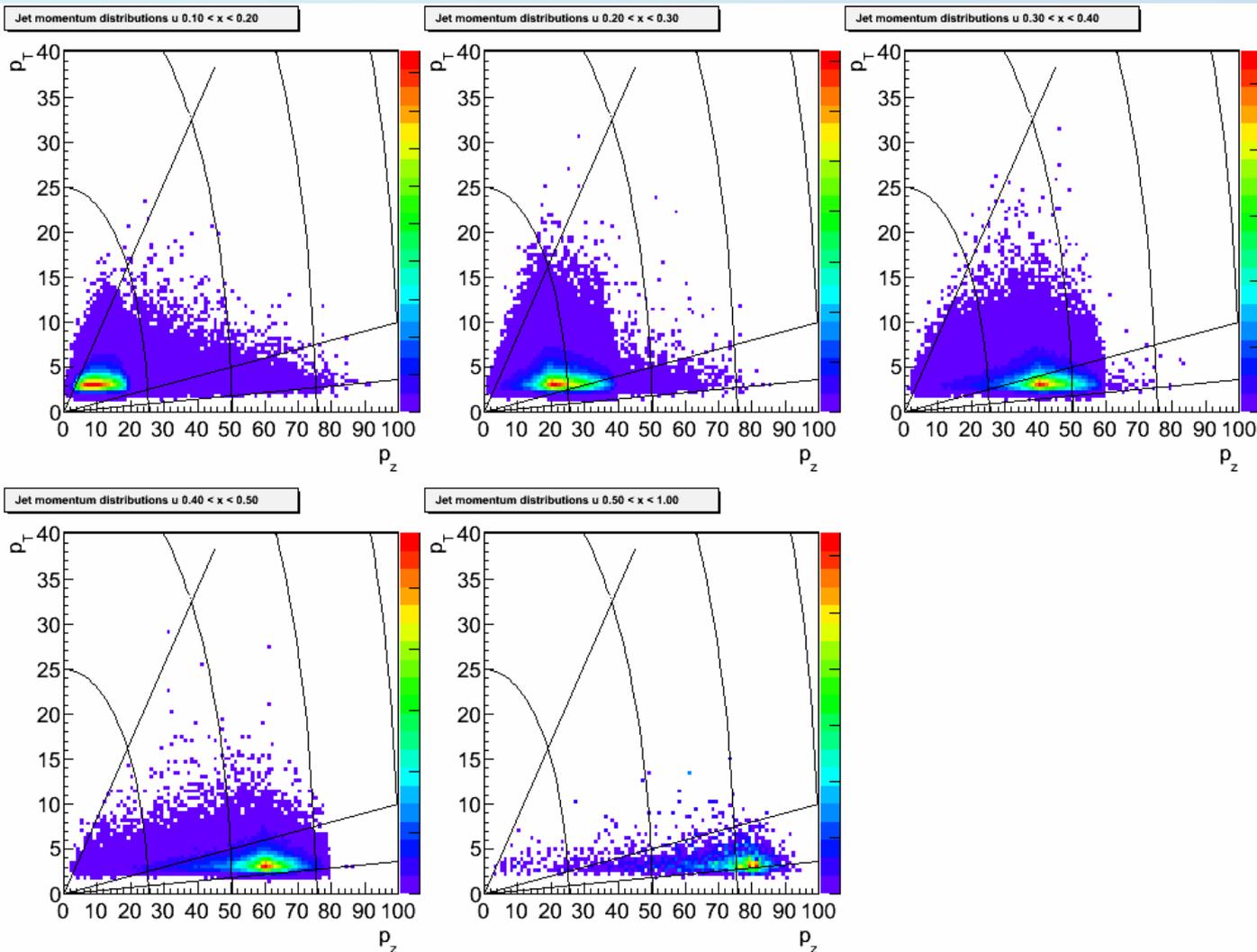


Collins π^0



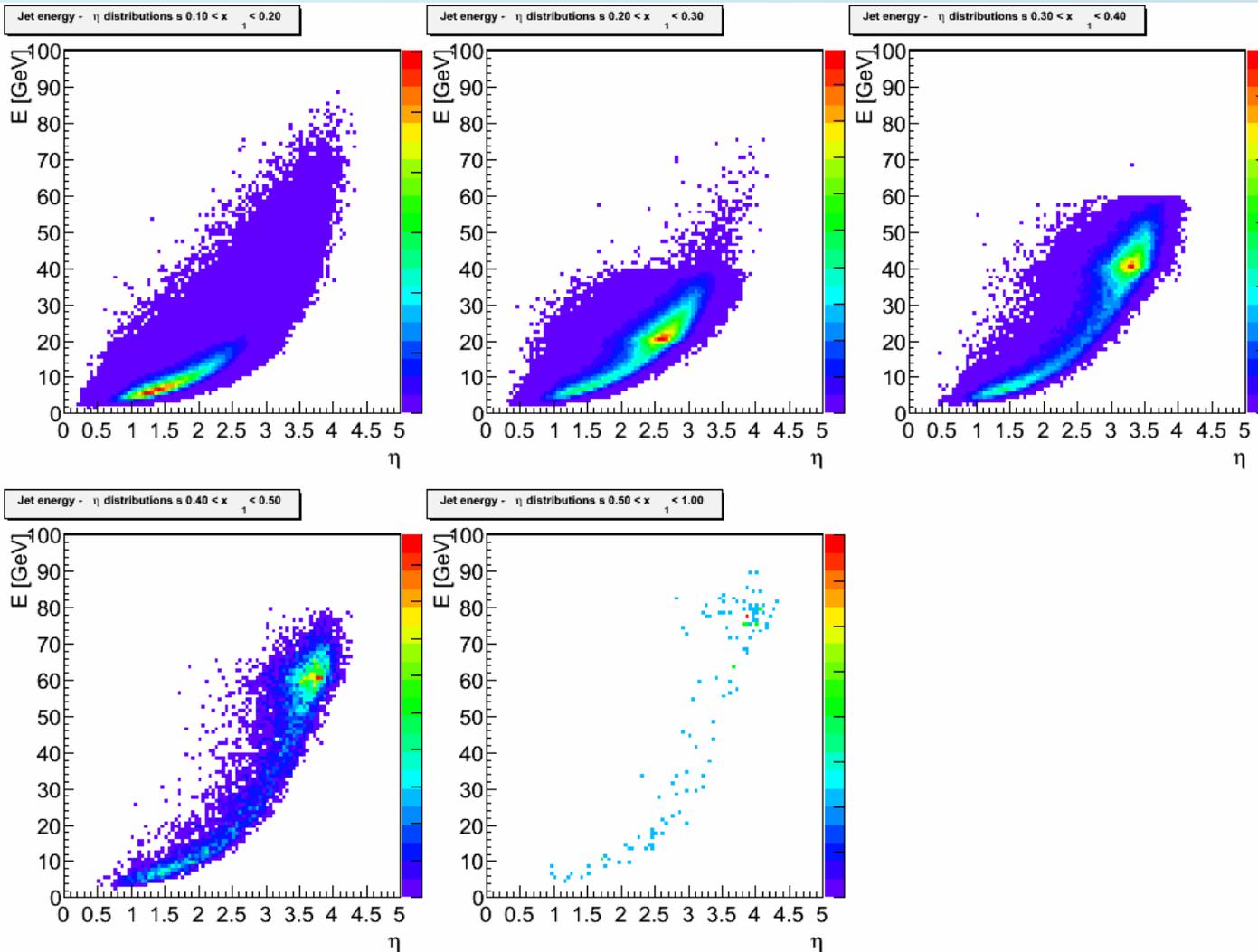
Some averaging between u and d transversity and fav and disfav Collins, but positive net effect

Jet energy and rapidity u-jets

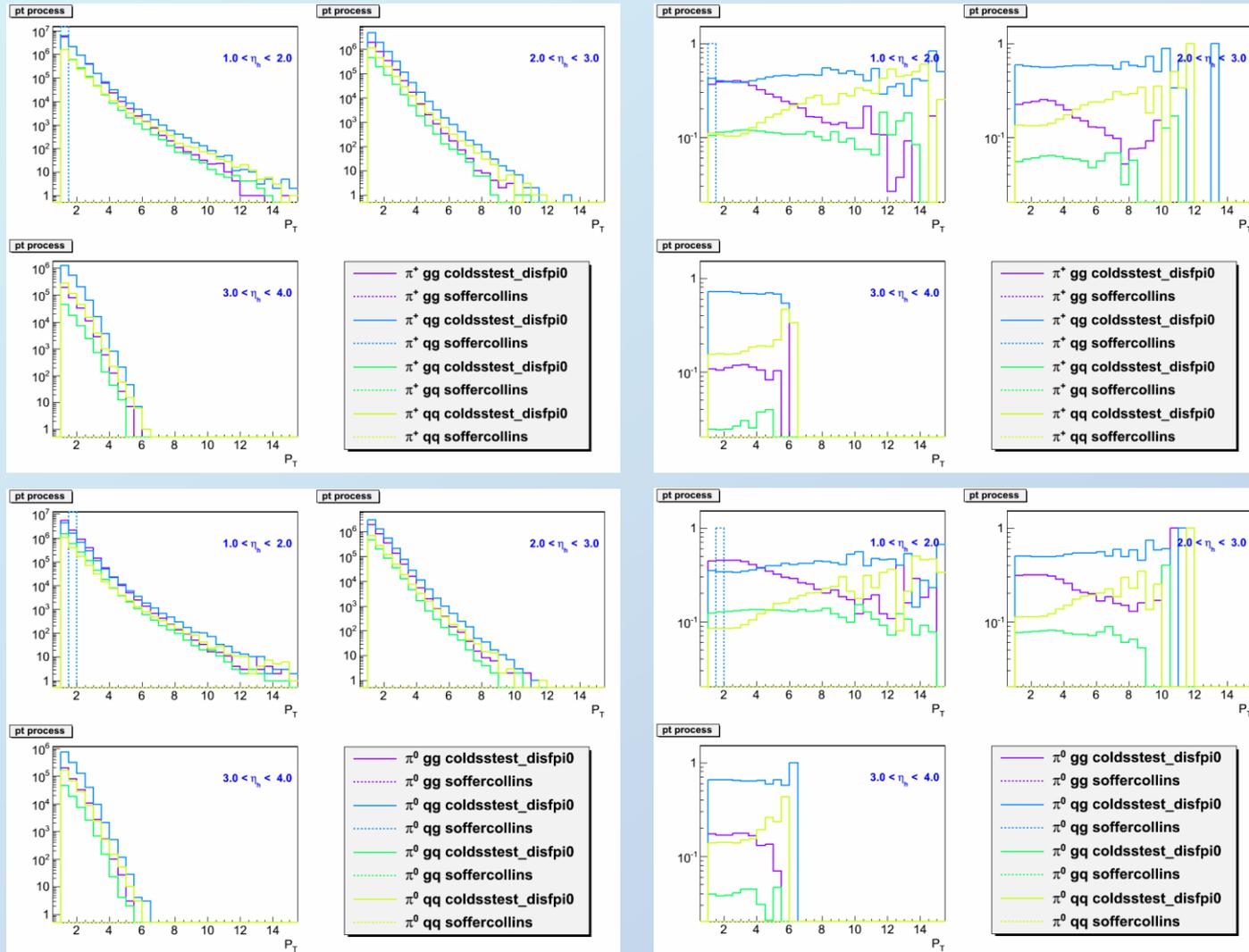


Baseline for
TTPMC:
100 GeV pp
Hard light
processes (c_{kin}
> 1GeV),
Hadrons in 1-4
rapidity range
with $P_t > 1\text{GeV}$

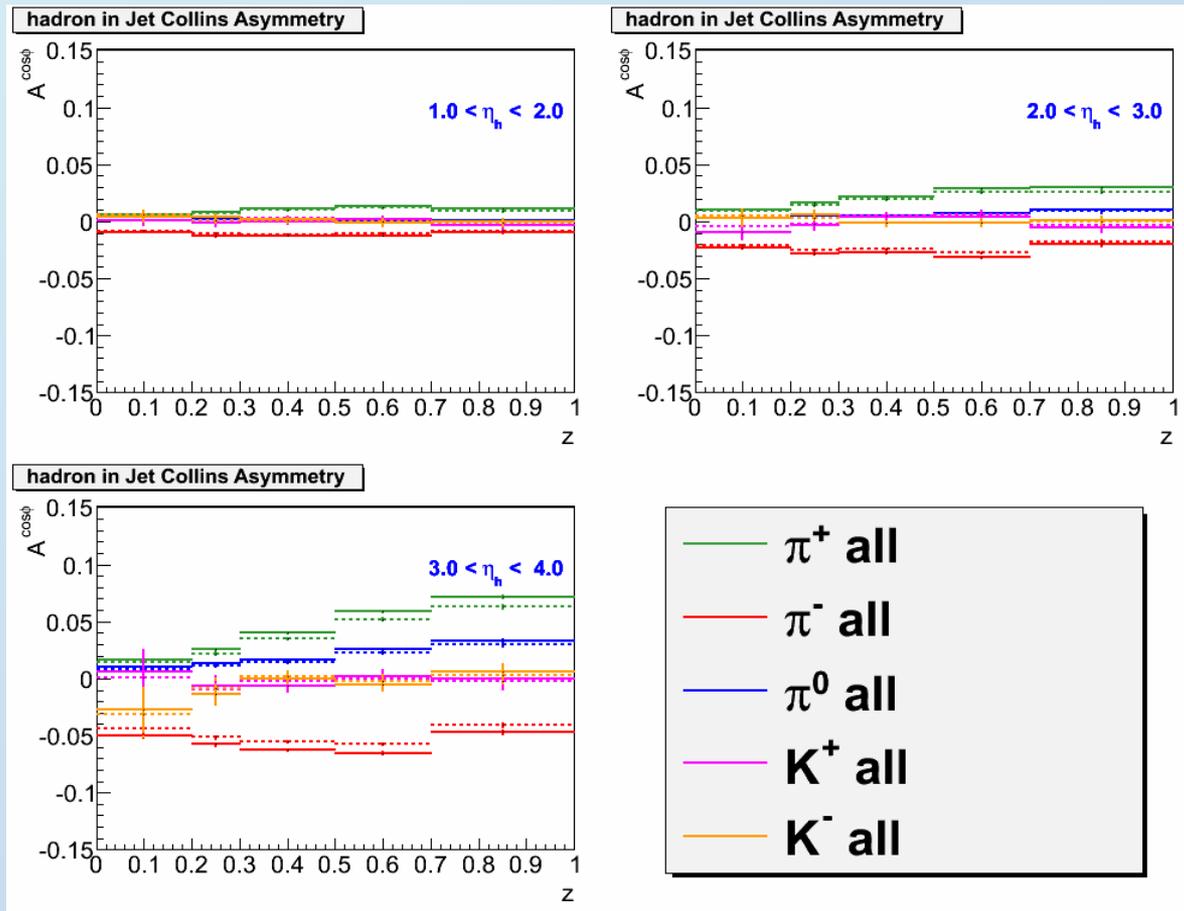
Jet eta



Process fractions



Comparison of hadron Collins



No K
asymmetrie
s
implemente
d currently

Dashed
curves are
smeared
angle fit
results

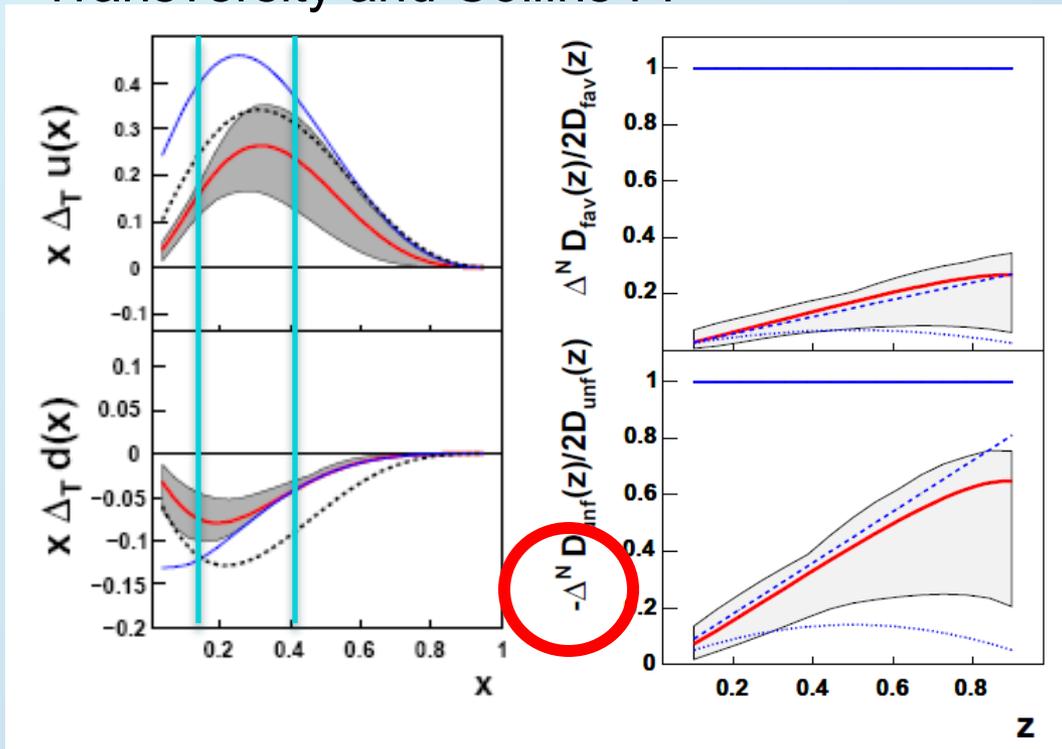
TPPMC Simulation setup

Developed by J. Lajoie, extended by T. Burton and A. Dion,
slight updates by RCS

- TPPMC: 2-2 process from Pythia, fragmentation done according to parameterizations, spin dependent pdfs according to parameterizations:
 - Collins from Torino parameterization (**so far no kaon Collins**)
 - Transversity from Soffer bound
 - Sivers included from Torino (w/o sign change, ignoring potential sign issues with higher twist f_u , but anyway small effect on traditional AN asymmetries in these simulations)
 - Any hadrons with $p_t > 1$ GeV
 - About 11 nb^{-1} of statistics (Asymmetries certainly not statistics starved, assuming we find the jets and identify the hadrons 😊)
 - Collins asymmetries use outgoing parton axis and energy for angle and z determination, **dashed lines smear azimuthal angle by Gaussian of 0.5 rad**

Transversity x Collins FF

Torino global analysis of
Transversity and Collins FF



- Current measurements in SIDIS via Collins FF still very limited in x
- Evolution not too well known
- Need different hadrons for flavor decomposition

Note: Collins functions for same quark but different pion charges and kaons different