Measurement of Quark Transversity through the Collins Mechanism in Mid-Rapidity Jets in $p^\uparrow p$ Collisions at STAR

ROBERT FERSCH, STAR COLLABORATION — The spin-dependent azimuthal distribution of leading charged hadrons within jets resulting from transversely polarized $p^\uparrow p$ collisions can be expressed as a convolution of three different quantities. The first of these, the quark transverse spin distribution ($\delta q(x, Q^2)$), quantifies the probability of the quark spin aligning with the transverse spin of the proton. There is also dependence upon a hard-scattering spin-transfer coefficient calculated using pQCD (estimated as $\sim 0.5$ in the STAR detector acceptance and trigger). Finally, there is a dependence on the Collins fragmentation function ($\Delta D(z)$), previously extracted from measurements made by the Belle, HERMES, and COMPASS collaborations. Measurement of the asymmetry in the reaction $p^\uparrow p \to \text{jet} + X \to \pi + X$ should allow for an independent extraction of $\delta q(x, Q^2)$ via the same methods used in existing global analysis by Anselmino, et al. Transversely polarized ($\sim 58\%$) $p^\uparrow p$ collision data ($\sim 1$ pb$^{-1}$) at $\sqrt{s} = 200$ GeV from the Solenoidal Tracker at RHIC (STAR) enable a statistically significant measurement of this asymmetry. The STAR detector provides full azimuthal coverage for both charged and neutral particle identification, and thus full jet reconstruction, in the mid-rapidity region ($|\eta| < 1$). Progress toward measurement of this asymmetry for leading charged pions will be presented.