



Contribution ID: 227

Type: **Parallel Session Talk**

Transverse Spin Asymmetries in the $p^\uparrow p \rightarrow p\pi^0 X$ Process at STAR

Wednesday 10 April 2019 09:30 (20 minutes)

A significant sample of $p^\uparrow p \rightarrow p\pi^0 X$ events have been observed at STAR in $\sqrt{s} = 200$ GeV transversely polarized pp collisions, where an isolated π^0 is detected in the forward pseudorapidity range $2.65 < \eta < 3.9$ along with the forward-going proton p , which scatters with a near-beam forward pseudorapidity into Roman Pot detectors. The sum of the π^0 and the scattered proton energies is consistent with the incident proton energy of 100 GeV, indicating that no further particles are produced in this direction. It is postulated that the forward incident proton may have fluctuated into a $p + \pi^0$ system, with an angular momentum correlated with the initial proton spin. The backward-going proton interacts with the $p + \pi^0$ system, which then separates such that the π^0 has a transverse momentum of ~ 2 GeV/ c and the proton has a transverse momentum of ~ 0.2 GeV/ c , while the backward proton shatters into the remaining particles X , all in the backward direction. Correlations between the π^0 and scattered proton will be presented, along with single spin asymmetries which depend on the azimuthal angles of both the pion and the proton. This is the first time that spin asymmetries have been explored for this process, and a model to explain their azimuthal dependence is needed.

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Session Classification: WG2: Small- x and Diffraction

Track Classification: WG2: Low- x and Diffraction