Measurement of transverse single-spin asymmetries for di-jet production in polarized p+p collisions at $\sqrt{s} = 200$ GeV at STAR

Huanzhao Liu, on behalf of the STAR collaboration
Indiana University, Center for Exploration of Energy and Matter

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Abstract

Our understanding of the origin of the nucleon spin remains incomplete. Determining the partonic orbital angular momentum (OAM) contributions is particularly challenging experimentally. One possible signature for the partonic OAM would be detection of a non-zero Sivers effect, which characterizes the correlation between the transverse momentum of a parton ($\vec{k}_T$) and the transverse spin ($\vec{S}$) of its proton, moving in the longitudinal ($\vec{p}$) direction. Experimentally, the Sivers function can be accessed by searching for a preference in di-jet transverse opening angle, which reverses direction when the beam polarization direction is flipped. A previous effort by STAR using 1 pb^{-1} of p+p data taken in 2006 at $\sqrt{s} = 200$ GeV did not find a significant effect due to limited statistics. In 2012 and 2015, STAR accumulated much larger datasets ($\sim$33 times the di-jets after event selection) at $\sqrt{s} = 200$ GeV. Moreover, a new technique has been implemented to tag the flavor of the fragmenting partons, to avoid cancellation between u and d quark effects, which are expected to have opposite signs. A preliminary result of the measurement of Sivers asymmetries using STAR 2012 and 2015 p+p data at $\sqrt{s} = 200$ GeV will be reported.