

Transverse single asymmetries in neutral pion production in $p + p$, $p+\text{Al}$ and $p+\text{Au}$ collisions at mid-rapidity using the PHENIX detector system

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Abstract

Historically, large transverse single spin asymmetries (SSA) have been measured in proton-proton collisions which are nearly independent of the collision energy. At RHIC, both PHENIX and STAR experiments measured SSA's in neutral pion and η meson production from $p + p$ collisions, in central and forward pseudo rapidity regions (η). The central η measurements were found to be consistent with zero and the forward measurements showed non-vanishing asymmetries and an increase with increasing Feynman- x . Efforts to understand their origins have resulted in very substantial improvements in our understanding of QCD and the nucleon structure. The nuclear effect on SSA may deepen our understanding in strong interaction dynamics in nuclear collisions. In polarized proton nucleus collisions already new surprises were found in very forward neutron asymmetries which warrant to study also the A dependence of the pion asymmetries. In this talk we present the status of the mid-rapidity single spin asymmetry measurements of neutral pions in $p + p$, $p+\text{Al}$ and $p+\text{Au}$ collisions at $\sqrt{s} = 200$ GeV.