

Nuclear Dependence of Transverse Single-Spin Asymmetries in Polarized $p+A$ Collisions at RHIC

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Large transverse single-spin asymmetries (TSSA) in hadron production at forward rapidity have been observed in polarized $p+p$ interactions for many decades, over a large range of center-of-mass energies, and have led to the investigation of spin-momentum correlations such as the Sivers and Collins effects. In the last few years, it has been discovered at RHIC that these single-spin asymmetries may be enhanced or suppressed in $p+A$ collisions, and the nuclear-size and centrality dependence have been studied. A variety of phenomena have been observed and likely they do not have all a single explanation; we see an apparent quenching of the TSSA in forward charged hadron production with increasing nuclear size, while we see an enhancement in the asymmetry in J/ψ production, and in very forward neutron production even a sign change in the asymmetry is seen. Other systems, such as π^0 production at central rapidity, do not display a nuclear-size dependence. These observations provide a bridge between the study of the initial state in heavy-ion collisions and that of the nucleon spin puzzle, and open up a new method for the investigation of cold nuclear matter.

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