

HAW05-2005-000745

Abstract for an Invited Paper
for the HAW05 Meeting of
the American Physical Society

Exploration of Transverse Proton Structure with the PHENIX Experiment at RHIC¹

MATTHIAS GROSSE PERDEKAMP, UIUC and RBRC

Over the past 30 years large single spin asymmetries have been observed for inclusive hadron yields in polarized proton-proton collisions. The physics of the origin of these asymmetries remains unexplained and constitutes an important challenge to the understanding of the strong interaction: QCD itself predicts no sizeable asymmetries at hard scales. Novel mechanisms involving spin- or transverse momentum dependent effects in either the initial or final state were proposed. Recently, experimental information from semi inclusive deep inelastic scattering experiments at DESY and Jefferson Laboratory appear to suggest that the observed transverse spin effects originate from: (a) k_T -dependent quark distribution functions proposed by Sivers and (b) spin dependent quark distributions (transversity) in transversely polarized protons. The interpretation of the experimental results from semi inclusive deep inelastic scattering at soft scales is based on assuming the validity of a factorization ansatz in which higher order terms from the operator product expansion and perturbative QCD can be neglected. Experiments on transverse spin effects at RHIC are carried out at hard scales and an unambiguous theoretical interpretation becomes available. This opens an exciting window to study transverse proton spin structure in polarized proton-proton collisions at RHIC. In this talk we present first results on A_N for inclusive hadron production and discuss prospects for future measurements of Sivers and transversity distributions with the PHENIX detector.

¹On behalf of the PHENIX Collaboration