

Polarized He3 Ion Source for RHIC and eRHIC

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The addition of a polarized neutron beam source to the Relativistic Heavy Ion Collider at Brookhaven National Laboratory would present promising opportunities for the study of nucleon structure. Polarized neutron collision measurements of transverse spin asymmetries in Drell-Yan scattering would allow a search of the predicted sign switch for u and d quark flavors in the Sivers function. In a future electron-ion collider, precision tests of the Bjorken sum rule could be carried out with both proton and neutron beams. Polarized ^3He offers an effective polarized neutron beam which is accessible with RHIC spin manipulation. We are developing such a source leveraging metastability exchange optical pumping of ^3He and utilizing the existing Electron Beam Ionization Source at RHIC. We aim to deliver approximately $1.5 \cdot 10^{11}$ doubly ionized ^3He atoms per pulse at 70% polarization into RHIC. The source is under development at MIT and an initial test of the principle at BNL is under construction. We will outline the development progress and present results from recent tests.

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