

Overview of SpinQuest Polarized Target System

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SpinQuest is a polarized target experiment that utilizes the 120 GeV proton beam from the Main Injector facility at Fermilab. The aim is to measure the Sivers asymmetry for the light sea quarks in the longitudinal momentum fraction range of 0.1–0.5 in the Drell-Yan process. A non-vanishing Sivers function for sea quarks is evidence of sea quark orbital angular momentum. SpinQuest intends to use a high-intensity proton beam on polarized targets with aspirations of obtaining more than 4×10^{12} protons per beam spill (4.4 seconds) and achieve an integrated luminosity of about $2 \times 10^{42} \text{ cm}^{-2}$ with the solid-state transversely polarized ammonia, NH_3 , and deuterated ammonia, ND_3 , targets. The polarized target system, including its split-pair 5 T superconducting magnet, is kept at a very low temperature via the ^4He evaporation refrigerator. The latter operates at 1 K through high-powered evaporation facilitated by a roots stack with a pumping rate of $\sim 17,000$ liters per hour. With such a setup, the expected average target polarization of $\sim 80\%$ (32%) for NH_3 (ND_3) will be achieved based on the dynamic nuclear polarization technique. In this talk, a brief overview of the polarized target system, along with its current performance during the ongoing beam commissioning period, will be presented.

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Primary author: ANSARI, Vaniya (Mississippi State University)

Presenter: ANSARI, Vaniya (Mississippi State University)

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