

# The SpinQuest (E1039) experiment's polarized target system

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## Abstract

The SpinQuest experiment at Fermilab aims to measure the Sivers asymmetry for the light sea quarks in the longitudinal momentum fraction range of  $0.1 < x_B < 0.5$  from the Drell-Yan process. A nonzero Sivers asymmetry measurement would be indicative of a nonzero orbital angular momentum contribution from the sea quarks. The SpinQuest experiment uses the proton beam from Fermilab's 120 GeV main injector, which will provide about  $10^{12}$  protons per second during a 4.4 seconds spill. The SpinQuest polarized target uses a superconducting split-pair magnet with an operating magnetic field of 5T with transversely polarized  $\text{NH}_3$  or  $\text{ND}_3$  targets (8cm long target cells). The maximum intensity that the target can handle will be determined during beam-target commissioning. As proposed SpinQuest will be the highest integrated luminosity around  $2 \times 10^{42} \text{cm}^{-2}$  ever on a solid polarized target. The helium-4 evaporation refrigerator operates at 1 Kelvin using high-powered evaporation from a roots stack with a pumping rate of nearly 17,000  $\text{m}^3/\text{hr}$ . The anticipated average target polarizations of 80% for protons and 32% for deuterons will be measured using three NMR coils equally spaced apart in the target cell. An overview of the SpinQuest target system will be presented.