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Transverse single spin asymmetry in J/ψ Production in $p\vec{p}$ interactions at SpinQuest

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In the E1039/SpinQuest experiment at Fermi National Accelerator Laboratory, the Main Injector beam of 120 GeV protons will be incident upon a transversely polarized proton (NH_3) target, and we will observe $\mu^+\mu^-$ pairs from charmonium and Drell-Yan production. We expect that the J/ψ and ψ' will be produced by a mixture of $q\bar{q}$ and gg interactions. Due to the high cross section of these channels and the very high luminosity of this experiment ($\approx 10^{36} \text{ cm}^{-2}\text{s}^{-1}$) we will be able to get enough statistics in a few weeks to report on the transverse single spin asymmetry (TSSA) in the process $p + p^\uparrow = J/\psi + X$. In order to get enough statistics within a short period of time, we will optimize the detector setup including the relative polarity of the spectrometer's two magnetic fields. Such asymmetries will shed light on the J/ψ production mechanism, a long-standing question in QCD, while also exploring the transverse structure of the proton.

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