HERMES and SLAC E161

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SLAC experiment E160 is approved to measure the asymmetry for polarized photoproduction of charmed quarks from polarized targets, using a large solid angle muon spectrometer. A quasi-mono-chromatic circularly polarized photon beam will be produced from an oriented diamond crystal.

The target will be longitudinally polarized LiD at a temperature of 0.3 K, centered in a 7 T magnetic field to obtain high polarization. Photoproduction of open charm will be tagged by decays of D mesons into high transverse momentum muons. The L/R asymmetry for producing open charm is closely related to the fundamental polarized gluon spin density $\Delta g(x)$. The asymmetry for single muons will be measured as a function of muon momentum, muon transverse momentum, and photon beam energies with sufficient precision to discriminate among models of $\Delta g(x)$ that differ from each other by as little as 10% in the range $0.1<x<0.5$. Significant constraints will be placed on both the shape and magnitude of $\Delta g(x)$ in this x region.
The projected errors are significantly smaller than for other experiments that plan to make direct measurements of $\Delta g(x)$. Plans for future measurements at HERMES will also be discussed.