# Novel Physics with Tensor Polarized Deuteron Targets

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Development of solid spin-1 polarized targets will open the study of tensor structure functions to precise measurement, and holds the promise to enable a new generation of polarized scattering experiments. In this talk we will discuss a measurement of the leading twist tensor structure function $b_1$, along with prospects for future experiments with a solid tensor polarized target.

The recently approved JLab experiment E12-13-011 will measure the leading twist tensor structure function $b_1$, which provides a unique tool to study partonic effects, while also being sensitive to coherent nuclear properties in the simplest nuclear system. At low $x$, shadowing effects are expected to dominate $b_1$, while at larger values, $b_1$ provides a clean probe of exotic QCD effects, such as hidden color due to 6-quark configuration. Since the deuteron wave function is relatively well known, any non-standard effects are expected to be readily observable. All available models predict a small or vanishing value of $b_1$ at moderate $x$. However, the first pioneer measurement of $b_1$ at HERMES revealed a crossover to an anomalously large negative value in the region $0.2 < x < 0.5$, albeit with relatively large experimental uncertainty.

E12-13-011 will perform an inclusive measurement of the deuteron tensor asymmetry in the region $0.16 < x < 0.49$, for $0.8 < Q^2 < 5.0$ GeV$^2$. The UVa solid polarized $ND_3$ target will be used, along with the Hall C spectrometers, and an unpolarized 115 nA beam. This measurement will provide access to the tensor quark polarization, and allow a test of the Close-Kumano sum rule, which vanishes in the absence of tensor polarization in the quark sea. Until now, tensor structure has been largely unexplored, so the study of these quantities holds the potential of initiating a new field of spin physics at Jefferson Lab.