

Polarized Proton Target for the g_2^p Experiment

Melissa Cummings

The College of William and Mary

(For the Jefferson Lab Hall A E08-027 Collaboration)

APS April Meeting

The g_2^p experiment was completed in Jefferson Lab's Hall A in the spring of 2012. These data will provide the first measurement of the proton's g_2 structure function in the region $0.02 < Q^2 < 0.2 \text{ GeV}^2$. A large scale installation was required for the g_2^p experiment, including a polarized ammonia (NH_3) target never before used in Hall A. Based on the principle of Dynamic Nuclear Polarization (DNP), microwave pumping is used to polarize the target material (irradiated ammonia) in a high magnetic field at a temperature of 1K. In order to achieve the proposed kinematic range for the experiment, the target magnet field was used at both 2.5T and 5T. Few studies of DNP have been done previously with a target field of 2.5T, making this data of particular interest. In addition, an experiment to measure the proton form factor ratio (G_E/G_M) ran concurrently with the g_2^p experiment and required a different target polarization direction from the g_2^p experiment. Therefore, a rotatable target chamber was needed for transition between configurations. This talk will introduce the concept of DNP and describe the unique challenges faced in the design of the g_2^p target. Performance indicators such as polarization decay rate and anneal time will be presented along with preliminary polarimetry results.