

ABSTRACT

We propose to measure the parity violating asymmetry in ${}^4\text{He}(\vec{e}, e')$ elastic scattering at an incident electron energy of 3.2 GeV using the Hall A HRS spectrometers and the septum magnets to reach a scattering angle of 6° . The average Q^2 of the experiment will be $0.1 (\text{GeV}/c)^2$, similar to the recently approved HAPPEX II experiment. 35 days of running on ${}^4\text{He}$ and on a blank Al cell will result in 2.2% statistical errors. The estimated systematic errors of 2.1% are dominated by the beam polarization measurement and are similar to that expected for the approved Lead parity violating experiment. The overall combined experimental error is 3%. Recent results from the 1999 HAPPEX run indicate that the systematic errors can be achieved with anticipated improvements in the Hall A Møller and Compton polarimeters. This experiment will measure the leading strange charge coefficient $\rho_s = \frac{dG_E^s(\tau)}{d\tau}$ at $\tau \rightarrow 0$ to an accuracy of ± 0.5 which should be capable of yielding a significant nonzero result, since available models for ρ_s range from $-3 \rightarrow 3$. When combined with the results from HAPPEX II, which will measure the linear combination $\rho_s + \mu_p\mu_s$, where μ_s is the strange magnetic moment, both ρ_s and μ_s can be extracted.