

ABSTRACT

We present an update to experiment E91-004, a measurement of parity violating elastic electron scattering from ^4He at the location of the first maximum of the ^4He charge form factor. E91-004 was approved in 1993 with an “A” rating for 85 days of beam. The experiment will use a beam energy of 3.3 GeV, a 20 cm long high pressure helium target, and the two Hall A spectrometers at 13.5° and 3.2 GeV/c to detect scattered electrons. The parity-violating amplitude is sensitive to the contribution of strange quarks to the structure of ^4He . In the simple one-body approximation of the helium wave function, this measurement will be sensitive to the nucleon’s strange electric form factor at $Q^2 = 0.6 \text{ (GeV/c)}^2$. Because ^4He is a ($J=0, T=0$) nucleus, clean information on the strange electric form factor can be determined with a single measurement with little theoretical uncertainty. In view of the anticipated performance of the polarized source of 100 μA delivery at 80% polarization, we request reapproval of 65 days of beam.