Recent results from the SAMPLE Experiment

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Previously the SAMPLE collaboration measured the parity-violating asymmetry in elastic electron scattering on hydrogen and quasielastic electron scattering on deuterium at backward angles at 200 MeV at the MIT-Bates laboratory [1,2,3]. Combining the results of these measurements allows us to separately determine the nucleon's strange magnetic form factor and the nucleon's neutral weak axial form factor. The neutral weak axial form factor as measured in electron scattering includes anapole contributions and a class of electroweak radiative corrections that are absent in neutrino scattering. The anapole moment is identified as the parity-violating coupling of a photon to the nucleon and is expected to be the largest of a class of axial radiative corrections. It can arise as a result of, for example, a weak interaction between two quarks inside the nucleon. The combined results from the previous two SAMPLE experiments yielded a measurement of the axial form factor substantially different from the theoretical estimate [3]. In order to confirm this observation with a measurement that has an improved signal-to-background ratio, a new measurement of the parity-violating asymmetry in quasielastic electron scattering on deuterium at 125 MeV has been carried out. In this talk, results from the new measurement will be presented.

References

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