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A New Beam Modulation Strategy for the Q^p_{weak} Experiment[1]

F.N.U. NURUZZAMAN, Mississippi State University, Q-WEAK COLLABORATION — A new, robust strategy is presented for beam modulation in the Q-weak experiment. The objective of the Q-weak experiment is to measure the weak charge of the proton via the parity violating asymmetry (< 1ppm) in elastic e-p scattering. The e-p scattering rate largely depends on five beam parameters: horizontal position (X), angle (X), vertical position (Y), angle (Y), and beam energy (E). Changes in these beam parameters when the beam polarization is reversed will create false asymmetries. Although we will attempt to keep changes in beam parameters during reversal as small as possible, we will also measure beam parameter differences and correct the false asymmetries. To do this, we will modulate X, X, Y, Y using four air-core dipoles in the Hall C beamline and measure the beam sensitivities. (We will also modulate beam energy using an SRF cavity.) Two air-core dipoles separated by $\sim$10m will be pulsed at a time to produce relatively pure position or angle changes at the target, for virtually any tune of the beamline. Some preliminary tests of the air-core coils and the associated control instrumentation will be discussed.

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