Abstract Submitted
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Measurement of Q^2 for the Q_{weak} Experiment[1] JULIETTE MAMMEI, Virginia Tech, QWEAK COLLABORATION — The Q_{weak} collaboration proposes to make a precise measurement of the parity violating elastic electron-proton scattering asymmetry at a Q^2 of 0.03 $(\mathrm{GeV/c})^2$. A 2200 hour measurement with a 1.165 GeV, 85% polarized, 180 μA beam on a 35 cm LH_2 target will determine the proton's weak charge with $\simeq$ 4% error. In the absence of physics beyond the Standard Model, this will provide a $\simeq 0.3\%$ measurement of $\sin^2\theta_w$, the weak mixing angle. In order to achieve such high precision, $\langle Q^2 \rangle$ must be determined to $\pm 0.5\%$. A precision collimator will define the Q^2 acceptance of the experiment. A dedicated tracking system will determine the difference between the actual Q^2 acceptance of the experiment, which includes energy loss and radiative effects, and the simple geometrical acceptance as defined by the collimator. The tracking system will operate at reduced beam current to determine, on an event-by-event basis, the scattered electron angle and energy, interaction vertex, and the angle and position of the electron at the entrance to the main detector. This will allow the determination of $\langle Q^2 \rangle$ and the efficiency map of the main Čerenkov detector. The tracking system will also determine the "dilution factor", the contribution of non-elastic events from the target and backgrounds in the hall. This talk will present an overview of the collimator and tracking system design.

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