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Atomic Hydrogen Moller Polarimeter Design for P2 Experiment
YUFAN CHEN, RAKITHA BEMINIWATTHA, Louisiana Tech University, P2 COLLABORATION — P2 experiment held by MESA in Mainz is targeting for a measurement of the weak charge of the proton based on the parity violating asymmetry in the elastic scattering of polarized electrons off unpolarized nuclei, it is proposed to get the weak mixing angle $\sin^2\theta_\omega$ to a precision as high as of 0.13% at a four momentum transfer of $Q^2 = 4.5 * 10^-3 GeV^2$ to test the standard model to a high mass scale at 155MeV beam energy. Therefore an atomic hydrogen Møller polarimeter is proposed for measuring beam polarimetry real time using Møller scattering.

A magnetic chicane based design is proposed for detecting Møller electrons for the polarimeter.

The polarimeter is designed to precisely separate the main beam and scattered Møller electrons while maintaining a total length of 1.72 meters and 0.5-0.75T for the dipole magnets.

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