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Design of the liquid hydrogen target for the P2 parity violating experiment at MESA

The P2 experiment aims to precisely measure the weak mixing angle $\sin^2\theta_W$ through parity-violating electron-proton scattering at low momentum transfer. This is projected to achieve a relative precision of 0.14% for $\sin^2\theta_W$. A crucial component of the experiment is a 60 cm long liquid hydrogen (lH_2) target. It is designed to handle a heat load of 4000 W while maintaining a density reduction below 2% and density fluctuations below 10 ppm. One of the important aspects of this is the design of the internal conical flow diverter in the lH_2 target cell.

In this poster, simulation results for the design of the conical flow diverter are presented. Along with this, the P2 experiment is introduced, and the current design of the lH_2 target cell is explained.

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