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Hall probe Calibration System Design for the Mu2e Solenoid Field Mapping System

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Mu2e experiment at Fermilab is set out to search for charged-lepton flavor violation by looking for muon to electron conversion in the field of the nucleus. The concept of the experiment is to generate low momentum muon beam, stopping the muons in a target and measuring the momentum of the conversion electrons. The implementation of this approach utilizes a complex magnetic field: graded solenoidal and toroidal field. Precise knowledge of the magnetic field is crucial in the muon transport process and in the electron momentum measurement. It is planned to map the solenoid field with calibrated 3D Hall probes up to 10^{-4} accuracy. This article describes a new design of a Hall probe Calibration System that will be used to calibrate 3D Hall probes to better than 10^{-4} accuracies for the Mu2e Solenoid Field Mapping System.

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