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Magnetometry standard for the muon $g-2$ experiment

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A key requirement of the $g-2$ experiment, aiming to measure the muon anomalous magnetic dipole moment to 0.14ppm, is to monitor the magnitude of the magnetic field around the storage ring to 0.07ppm. This will be done with several hundred proton NMR magnetometers. These must all be calibrated against a standard magnetometer, to account for the ~ 0.1 ppm shifts of individual probes due to the magnetic properties of the materials. We are developing a ^3He magnetometer to provide an independent check of the standard calibration probe used for the Brookhaven $g-2$ experiment, which was based on a spherical water sample.

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