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SQUID-based BPM for proton EDM experiment

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The pEDM experiment aims to search for the electric dipole moment (EDM) of proton with 10^{-29} e-cm sensitivity, approximately 5 orders of magnitude better than the current experimental limit. The experiment is designed to store counter-rotating proton beams in an all-electric storage ring. The EDM of the particles will couple with the radial electric field, causing a spin growth around the radial axis in the particle's rest frame. The growth rate of this precession will be proportional to the EDM of the proton.

Magnetic field is a major source of systematic errors as it couples with magnetic dipole moment and dominates the spin precession. Among possible combinations, average radial magnetic field (B_r) is the most critical one. It should be kept at 10aT level. We are developing a novel BPM that is based on SQUID magnetometers for measuring the average magnetic field.

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