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The Storage Ring Proton EDM Experiment YANNIS SEMERTZIDIS, CAPP/IBS and KAIST, STORAGE RING PROTON EDM COLLABORATION — The storage ring pEDM experiment utilizes an all-electric storage ring to store $\sim 10^{11}$ longitudinally polarized protons simultaneously in clock-wise and counter-clock-wise directions for 10^3 seconds. The radial E-field acts on the proton EDM for the duration of the storage time to precess its spin in the vertical plane. The ring lattice is optimized to reduce intra-beam scattering, increase the statistical sensitivity and reduce the systematic errors of the method. The main systematic error is a net radial B-field integrated around the ring causing an EDM-like vertical spin precession. The counter-rotating beams sense this integrated field and are vertically shifted by an amount, which depends on the strength of the vertical focusing in the ring, thus creating a radial B-field. Modulating the vertical focusing at 10kHz makes possible the detection of this radial B-field by a SQUID-magnetometer (SQUID-based BPM). For a total number of n SQUID-based BPMs distributed around the ring the effectiveness of the method is limited to the $N = n/2$ harmonic of the background radial B-field due to the Nyquist sampling theorem limit. This limitation establishes the requirement to reduce the maximum radial B-field to 0.1-1nT everywhere around the ring by layers of mu-metal and aluminum vacuum tube. The metho's sensitivity is $10^{-29} e \cdot \mathrm{cm}$, more than three orders of magnitude better than the present neutron EDM experimental limit, making it sensitive to SUSY-like new physics mass scale up to 300 TeV.

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