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CANTON- μ Proposal: A Next-Generation Muon $g-2$ Measurement at Sub-0.1 ppm Precision

We propose a next-generation precision measurement of the muon anomalous magnetic moment (muon $g-2$), at the High Intensity Heavy-Ion Accelerator Facility (HIAF) in China. The project, named CANTON- μ (Coherent Anomalous magNetic momenT ObservatioN with muon), represents the first muon $g-2$ experiment aimed at surpassing Fermilab precision. It introduces novel approaches based on HIAF's intense pulsed GeV-scale muon beams, particularly for negative-muon polarity. This talk will present expected muon beam intensity at HIAF, establishing the statistical reach and level of systematic control required to achieve a precision of 0.13 ppm in Phase 1, matching the current Fermilab precision, and 0.05 ppm in Phase 2 with the HIAF upgrade. This precision enables stringent tests of the Standard Model with sensitivity to new physics beyond current collider scales, and offers a uniquely sensitive test of CPT symmetry in muon sector, improving existing limits by more than an order of magnitude.

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