

Abstract Submitted
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The New Muon (g-2) Experiment at Fermilab DINKO POCANIC,
University of Virginia, NEW (G-2) COLLABORATION — We discuss a new proposal to measure a_μ , the muon anomalous magnetic moment, to 0.14 ppm at Fermilab, a fourfold improvement over the 0.54 ppm precision obtained in the BNL experiment E821. The muon anomaly is a fundamental quantity whose precise determination will have lasting value. We plan to use the unique FNAL complex of accelerators and rings to produce high-intensity bunches of muons, to be directed into the relocated BNL muon ring. The physics goal of the experiment, $\delta a_\mu = 16 \times 10^{-11}$, will require 21 times the statistics of the BNL measurement, and a $3\times$ reduction of the systematic error. Our goal is well matched to the anticipated advances in the effort to determine the standard model (SM) value of the anomaly. The present comparison, $\Delta a_\mu(\text{Expt.} - \text{SM}) = 295(81) \times 10^{-11}$, is already suggestive of possible new contributions to the muon anomaly. Assuming a 40% reduction of the current theory error, the combined uncertainty with our projected final result would be $\approx 31 \times 10^{-11}$, a sensitive and complementary benchmark for proposed SM extensions. The experimental data will also be used to improve the muon EDM limit by up to a factor of 100, and to make a higher-precision test of Lorentz and CPT violation.

Dinko Pocanic
University of Virginia

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