

Abstract Submitted
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Higher-Order Systematic Effects in the Muon Beam-Spin Dynamics for Muon $g-2$ ¹ JASON CRNKOVIC, Brookhaven Natl Lab, HUGH BROWN², Retired, BRANDON KROUPPA, Kent State University, ERIC METHODIEV, None, WILLIAM MORSE, Brookhaven Natl Lab, YANNIS SEMERTZIDIS, Center for Axion and Precision Physics Research, IBS and KAIST, VLADIMIR TISHCHENKO, Brookhaven Natl Lab — The BNL Muon $g-2$ Experiment (E821) produced a precision measurement of the muon anomalous magnetic moment, where as the Fermilab Muon $g-2$ Experiment (E989) is an upgraded version of E821 that has a goal of producing a measurement with approximately 4 times more precision. Improving the precision requires a more detailed understanding of the experimental systematic effects, and so three higher-order systematic effects in the muon beam-spin dynamics have recently been found and estimated for E821. The beamline systematic effect originates from muon production in beamline spectrometers, as well as from muons traversing beamline bending magnets. The kicker systematic effect comes from a combination of the variation in time spent inside the muon storage ring across a muon bunch and the temporal structure of the storage ring kicker waveform. Finally, the detector systematic effect arises from a combination of the energy dependent muon equilibrium orbit in the storage ring, muon decay electron drift time, and decay electron detector acceptance effects.

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