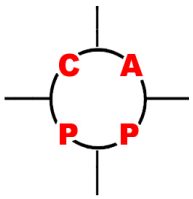

Center for Accelerator and Particle Physics
at
Illinois Institute of Technology

SEMINAR

"Recent Results from the Muon *g*-2 Experiment and Future Plans for Measurement of the Muon Electric Dipole Moment"

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Abstract

For a charged particle with spin, the magnetic moment is given by $\mu = g(e/2mc)$. The Dirac equation (1928) predicted $g = 2$ for a point particle. Attempts to calculate the first-order correction to 2 gave infinity. The *g*-value of the proton was measured to be 5.6 in the 1930's. We now understand this from the quark model: the proton is not a point particle but is composed of quarks and gluons. In 1947, an improved measurement of the *g*-value of the electron gave 2.002. Feynman, Schwinger, and others were then able to calculate the first order correction: $(\alpha/2\pi)$. The anomaly was defined as $a = (g - 2)/2$. A new precision measurement of the muon anomaly has been made at the BNL muon storage ring yielding $a_\mu = 11\ 659\ 202(14) \pm 6 \times 10^{-10}$, which does not agree well with the theoretical calculation of $a_\mu(\text{theory}) = 11\ 659\ 159.6 \pm 6.7 \times 10^{-10}$. This new measurement and the theory will be discussed. Also, plans for a new dedicated experiment to measure the electric dipole moment of the muon using the muon storage ring will be discussed. An electric dipole moment of an elementary particle violates time-reversal invariance and parity symmetry.

Thursday, May 17, 2001
Life Sciences, Room 111 at 11:00 AM