The Muon $g-2$ Discrepancy: New Physics or a Relatively Light Higgs?

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Abstract

After a brief review of the muon $g-2$ status, I'll discuss hypothetical errors in the Standard Model prediction that might explain the present discrepancy with the experimental value. None of them seems likely. In particular, a hypothetical increase of the hadroproduction cross section in low-energy $e^+e^-$ collisions could bridge the muon $g-2$ discrepancy, but it is shown to be unlikely in view of current experimental error estimates. If, nonetheless, this turns out to be the explanation of the discrepancy, then the 95% CL upper bound on the Higgs boson mass is reduced to about 135 GeV which, in conjunction with the experimental 114.4 GeV 95% CL lower bound, leaves a narrow window for the mass of this fundamental particle.