

Looking for a Muonic Force in the Muon Anomalies

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Significant deviations from SM predictions have been observed in $b \rightarrow s\mu^+\mu^-$ decays and in the muon $(g-2)$. Scalar leptoquark extensions of the SM are known to be able to address these anomalies, but generically give rise to lepton flavor violation or even proton decay. As a possible resolution, we introduce a lepton-flavored U(1) gauge symmetry to preserve the accidental symmetries of the SM. It is natural to consider the possibility that the gauge boson of this new force can account for the muon $g-2$, without the introduction of additional particles. An array of complementary constraints, including neutrino trident production and nonstandard neutrino interaction, rules out all but a few possible gauge groups as solutions to the muon $g-2$.

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