An accurate Lattice QCD+QED calculation of the muon $g-2$ with twisted-mass fermions

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The muon anomalous magnetic moment a_μ is one of the most accurately determined quantities in Particle Physics and a long-standing discrepancy of $\simeq 3.7$ standard deviations between the experimental determination and the Standard Model (SM) prediction might provide a guide towards uncovering the underlying theory beyond the SM. The forthcoming $g-2$ experiments at Fermilab (E989) and J-PARC (E34) aim at significantly reducing the experimental error, thus making the main theoretical uncertainty due to hadronic corrections a major limitation of such a stringent SM test. In this talk we present a first-principles lattice calculation of the hadronic vacuum polarisation (HVP) contribution to a_μ including electromagnetic and strong isospin-breaking corrections. Using the twisted-mass formulation of lattice fermions our result, $a_\mu^{\rm HVP} = 682\,(19)\cdot 10^{-10}$, is in agreement with recent determinations based on dispersive analyses of the experimental cross section data for e^+e^- annihilation into hadrons. A critical discussion of possible future developments will also be given.

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