An accurate Lattice QCD+QED calculation of the muon $g - 2$

with twisted-mass fermions

Davide Giusti*

Dipartimento di Matematica e Fisica, Università degli Studi Roma Tre and INFN, Sezione di Roma Tre,
Via della Vasca Navale 84, I-00146 Rome, Italy

The muon anomalous magnetic moment $a_\mu$ 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 $a_\mu$ including electromagnetic and strong isospin-breaking corrections. Using the twisted-mass formulation of lattice fermions our result, $a_\mu^{\text{HVP}} = 682 (19) \cdot 10^{-10}$, 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.

* davide.giusti@uniroma3.it