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Lattice artifacts proportional to the quark mass in the QCD running coupling

Tuesday 4 November 2025 18:00 (1h 30m)

In this work, we investigate discretization effects proportional to the quark mass, $O(am)$, on the QCD beta-function within lattice perturbation theory. Using the background field method and improved lattice actions, we compute the renormalization factor of the coupling constant and thus determine the beta-function. In this framework, we calculate, up to two-loop order, the contributions proportional to the quark mass arising in the background gluon propagator. The number of colors N_c and the number of quark flavors N_f are kept arbitrary throughout the calculation. We employ clover fermions together with Symanzik-improved gauge actions, involving Wilson loops with 4 and 6 links. This allows us to isolate the lattice artifacts that affect the determination of the running coupling. The removal of these effects is essential for high-precision, non-perturbative determinations of the strong coupling constant from lattice simulations.

Parallel Session (for talks only)

Standard Model parameters

Authors: Dr GAVRIEL, Demetrianos (University of Parma, INFN Parma, University of Cyprus); Dr SPANOUEDES, Gregoris (University of Cyprus); Prof. PANAGOPOULOS, Haralambos (University of Cyprus); Dr COSTA, Marios (Cyprus University of Technology, University of Cyprus, Rinnoco Ltd)

Presenter: Dr GAVRIEL, Demetrianos (University of Parma, INFN Parma, University of Cyprus)

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