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Toward new gradient flow based lattice determination of the strong QCD coupling at the Z-pole

Thursday, 23 March 2023 11:00 (1 hour)

A lattice implementation is described for the beta-function defined over infinite Euclidean space-time in the continuum. It is based on scale changes of the renormalized gauge coupling generated by infinitesimal or finite steps on the gradient flow. Harlander and Neumann calculated in this scheme the three-loop approximation to the continuum beta-function. Our goal is the nonperturbative lattice implementation of the scheme with matching to the three-loop results at weak coupling as we work toward the determination of the strong QCD coupling at the Z-pole. First test results are discussed in the Yang-Mills gauge theory without dynamical fermions and in multi-flavor QCD with massless femions.

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