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Hadronic contributions to the running of electromagnetic and weak couplings

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As present and future experiments in both the energy and precision frontiers look to identify new physics beyond the Standard Model, they require increasingly precise determinations of fundamental quantities like the electroweak couplings at various momenta. The latter can be obtained from experimental measurements or a particular reference value and the dependence on the energy. A precise, entirely theoretical determination of the running couplings is highly desirable, even more since the preliminary results of the E989 experiment in Fermilab were published, and non-perturbative techniques at small momentum are necessary.

In our talk, we present the latest results on these quantities of the Mainz group. We analyze a broad set of Coordinated Lattice Simulations ensembles with the time-momentum representation at various lattice spacings and pion masses. We perform an extrapolation to the physical point, we predict the running and compare it with other determinations, both from the lattice and phenomenology.

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