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The hadronic contribution to the running of the electromagnetic coupling

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The electromagnetic coupling that intervenes in the interactions between charged particles varies with the energy due to off-shell processes. In this work we compute the leading hadronic contribution to this running at low energies, where QCD is fully non-perturbative.

We employ a subset of CLS (Coordinated Lattice Simulations) ensembles with $N_f = 2+1$ and $O(a)$ improved Wilson fermions in open boundary conditions in time and periodic in space. For each ensemble we extracted the vacuum polarization function, which is proportional to the running, using the time-momentum representation. The set of ensembles has different particle masses and four lattice spacings, in such a way that we have been able to perform the chiral and continuum extrapolation.

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