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The hadronic contribution to the running of α and the electroweak mixing angle.

Monday 3 November 2025 14:50 (20 minutes)

We present an updated determination of the hadronic vacuum polarization contribution to the running of the electromagnetic coupling $\Delta\alpha^{(5)}_{\rm had}(-Q^2)$, and of the electroweak mixing angle in the space-like momentum range up to 12 GeV^2. Using $N_f = 2 + 1$ CLS ensembles at five lattice spacings and several pion masses, including the physical point, we achieve a significantly enhanced precision over our previous result. A refined analysis strategy based on telescopic series and a new family of kernel functions enables a clean separation of distinct Euclidean regions, disentangling strong cutoff effects at short distances from the pronounced chiral dependence at larger ones. Employing the Euclidean splitting technique, we convert our lattice results into an ab initio estimate of $\Delta\alpha^{(5)}_{\rm had}(M_Z^2)$. A detailed comparison with results from other lattice calculations and phenomenology is performed.

Parallel Session (for talks only)

Quark and lepton flavor physics

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