



Theory Seminar

“The neutral pion decay and the chiral anomaly on the lattice”

We perform a nonperturbative calculation of the pion-to-two-photon transition form factor and the associated decay width using lattice QCD. The amplitude for a two-photon final state, which is not an eigenstate of QCD, is extracted through a Euclidean time integral of the relevant three-point function. We utilize the all-to-all quark propagator technique to carry out this integration. We execute the calculation using the overlap fermion formulation, which ensures the exact chiral symmetry on the lattice and produces the chiral anomaly through the Jacobian of the chiral transformation. We calculate the form factor and decay width with a comprehensive estimate of various systematic errors, except for a possible discretization effect. Our results reproduce the prediction of the ABJ anomaly in the chiral limit and also agree with the PrimEx experimental measurement at the physical pion mass.

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