

Progress Towards the First Measurement of Direct CP-Violation in $K \rightarrow \pi \pi$ Decays From First Principles

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Direct CP-violation was first observed in the late 1990s in $K \rightarrow \pi \pi$ decays, and precise experimental measurements have since been made. However until recently it has not been possible to calculate its measure directly from the Standard Model due to it receiving large contributions from QCD in the hadronic regime in which perturbation theory is not applicable. This is unfortunate because these decays are highly sensitive to BSM sources of CP violation, and a comparison with the experimental result may lead to the discovery of new physics. Now, using lattice QCD, and combining decades of theoretical and computational developments, such a calculation has become feasible.

The RBC & UKQCD collaborations have recently published the first calculation of the $K \rightarrow \pi \pi$ decay amplitude in the $I=2$ channel. I will discuss the techniques used for this calculation and then describe our progress towards the more difficult task of measuring the decay in the $I=0$ channel, which represents the last hurdle before a full ab initio value for the measure of direct CP-violation can be obtained.

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