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Long-distance contributions to the rare kaon decay K+ -> pi+ nu nu-bar

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As flavor changing neutral current processes, rare kaon decays K -> pi nu nu-bar are highly suppressed in the standard model and thus provide ideal probes for the observation of new physics effects.

Given the importance of rare kaon decays, the CERN NA62 experiment aims at an observation of O(100) events of K+ -> pi+ nu nu-bar decay and a 10%-precision measurement of the branching ratio in two years. Another experiment, J-PARC KOTO, is dedicated to search for the CP-violating KL -> pi0 nu nu-bar decay.

Recognizing that the standard model predictions will soon be confronted with new experimental results, it is important to determine the long-distance contributions to K+ -> pi+ nu nu-bar with a controlled error.

In this talk I will present an exploratory calculation of the long-distance contributions to the K+ -> pi+ nu nu-bar decay amplitude from first principles using lattice QCD.

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