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Two photon contribution to the $K \rightarrow \mu\mu$ decay amplitude on a $1/a \approx 1$ GeV lattice

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The decay of a long-lived kaon to a pair of charged muons is a clean rare kaon decay channel which has been measured to the percent-level from experiment. Although the short-distance part of this decay mode is well known from the Standard Model, a direct comparison between theory and experiment is not straightforward due to the sizeable long-distance contribution from the exchange of two virtual photons. We have developed a formalism allowing the latter amplitude to be computed from lattice QCD, within which a final theory estimate at the ten-percent level should be plausible. In this contribution, we present our first preliminary result on a single ensemble at physical pion mass with $1/a \approx 1$ GeV including the connected and the leading disconnected diagrams.

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