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## Calculation of $K \rightarrow \pi\pi$ decay amplitudes with improved Wilson fermion in 2+1 flavor lattice QCD

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We present our results of the  $K \rightarrow \pi\pi$  decay amplitudes for both the  $\Delta I = 1/2$  and  $3/2$  channels. Calculations are carried out with  $N_f = 2 + 1$  gauge configurations previously generated by the PACS-CS Collaboration with the Iwasaki gauge action and nonperturbatively  $O(a)$ -improved Wilson fermion at  $a = 0.091$  fm and  $m_\pi = 280$  MeV on a  $32^3 \times 64$  ( $La = 2.9$ fm) lattice.

For the calculation of quark loop at the weak operator in the disconnected diagram, we use the stochastic method with the hopping parameter expansion technique and the truncated solver method proposed by Bali et al.. We find that these are very efficient methods.

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