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Lattice calculation of the K_L and K_S mass difference for physical quark masses

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The two neutral kaon states in nature, the K_L (long-lived) and K_S (short-lived) mesons, are the two time-evolution eigenstates of the $K^0 - \overline{K^0}$ mixing system. The prediction of their mass difference Δm_K based on the standard model is an important goal of lattice QCD. In this talk, I will present the preliminary results from a calculation performed on an ensemble of $64^3 \times 128$ gauge configurations with inverse lattice spacing of 2.36 GeV and physical quark masses. While the statistical error approaches a relatively small size of 9\%, several sources of systematic errors may have more significant effects. In this talk I will also address studies performed on smaller lattices to estimate the systematic errors in our result.

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