

Lattice QCD study of the $K^*(892)$ resonance at the physical point

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We present a lattice QCD study of the $K^*(892)$ resonance using eight $N_f = 2 + 1$ Wilson-Clover ensembles with three lattice spacings and six pion masses ranging from 135 to 320 MeV. For each ensemble, a large number of finite volume energy levels in the P -wave $K\pi$ channel are determined. The energy dependence of the scattering phase shift is then obtained from Lüscher's finite-volume method. To systematically assess parametrization dependence, the amplitude is described using three different models, which yield consistent results. The resulting phase shifts show a clear resonant behavior for all ensembles, and the corresponding $K^*(892)$ resonance pole is identified on the second Riemann sheet in the complex energy plane. The pole positions are extrapolated to the physical pion mass and the continuum limit, yielding a $K^*(892)$ resonance located at $\sqrt{s_0} = [883.0(6.9) - i20.1(2.2)]\text{MeV}$, which is in excellent agreement with the experimental value. This study provides a first-principles QCD determination of the $K^*(892)$ mass and width with estimated systematic uncertainties.

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