$\Lambda\Lambda - N\Xi$ interactions in $N_f = 2 + 1$ Lattice QCD

We present a lattice QCD study of two-baryon systems with strangeness $S = -2$, focusing on the $\Lambda\Lambda$ and ΞN interactions, which are essential for determining the existence of the H-dibaryon. Our calculations are performed on $N_f = 2 + 1$ CLQCD Wilson-Clover configurations, with lattice spacings range from $a \approx 0.05 - 0.105\,\mathrm{fm}$ and pion masses from $M_\pi \approx 135 - 317\,\mathrm{MeV}$. Using Lüscher finite volume method, we extract the scattering phase shifts from the spectra of the two-baryon systems. The analysis is then complemented using effective range expansion to determine the scattering length and effective range. Our results indicate a consistently weak interaction in the $\Lambda\Lambda$ channel across all ensembles. In contrast, the ΞN channel exhibits a noticeable attraction, suggesting the possible presence of a virtual state.

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