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Double Lambda He-6 in cluster effective field theory SHUNG-ICHI

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The bound state of ${}_{\Lambda\Lambda}^6\text{He}$ is studied as a three-body ($\Lambda\Lambda\alpha$) cluster system in cluster effective field theory at leading order (LO). We find that the three-body contact interaction exhibits the limit cycle when the cutoff in the integral equations is sent to the asymptotic limit, and thus it should be promoted to LO. We also derive a determination equation of the limit cycle which reproduces the numerically obtained limit cycle. We then study the correlations between the double Λ separation energy $B_{\Lambda\Lambda}$ of ${}_{\Lambda\Lambda}^6\text{He}$ and the scattering length $a_{\Lambda\Lambda}$ of the S -wave $\Lambda\Lambda$ scattering. The role of the scale in this approach is also discussed.

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