

Lattice QCD rules out some predictions for deeply-bound light-heavy tetraquarks

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Some phenomenological models, already fully constrained by fits to the ordinary meson and baryon spectrum, predict deeply-bound tetraquark states containing one or more heavy quarks. We describe lattice QCD studies of a number of channels where such predictions exist. While not precluding shallow binding, our lattice investigations find no evidence of deep binding in either doubly charmed or bottom-charm channels, allowing us to rule out models that predict deep binding in those channels. On the other hand, a consistent picture has emerged from lattice studies by a number of lattice groups of the existence of deeply-bound, strong-interaction-stable $I = 0$, $J^P = 1^+$ $ud\bar{b}\bar{b}$ and $I = 1/2$, $J^P = 1^+$ $\ell s\bar{b}\bar{b}$ tetraquarks, where $\ell = u$ or d . In this talk we provide the current status of these calculations, describing recent improvements that provide more robust results and shore up phenomenological expectations.

Collaboration

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