

Structure calculations of fully-heavy hexaquarks

We used a diffusion Monte Carlo technique to describe the properties of fully-heavy compact arrangements (no dibaryon molecules) including six quarks and no antiquarks within the framework of a constituent quark model. Only arrangements whose wavefunctions were eigenvectors of L^2 with eigenvalue $= 0$ were taken into account, what means that we only considered the subset of all the possible color-spin combinations that make the total wavefunctions antisymmetric with respect to the interchange of any two quarks of the same type. This means arrangements with spin $S = 0$ for $cccccc$, $bbbbbb$, $cccceb$, $bbbbbc$ and $cccbbb$ and spin $S = 0, 1, 2$ for the $cccbb$ and $bbbcc$ hexaquarks. In all cases, the masses of the six-quark arrangements are larger than the ones corresponding to the sum of any of the two baryons we can split them into, but smaller than the ones for a set of six isolated quarks, i.e., all of them are bound systems. The analysis of their structure indicates that all the hexaquarks considered in this work are compact objects, except the $cccbbb$, that appears to be a loose association of two baryons.

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