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# Heavy quark spin structure in hidden charm molecules

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Recent observations of exotic charmonium-like mesons above the $D\bar{D}$ threshold triggered heated discussions on their inner structures. The meson-antimeson molecule is a popular picture in understanding their properties. It has been proposed that the X(3872) is an S-wave $D\bar{D}^*$ molecule since its extreme closeness to the threshold. Although the charm quark and the anti-charm quark belong to different mesons, their total spin is one, which is called "heavy quark spin selection rule". We extend the study to general meson-antimeson case. In the heavy quark limit, we construct explicitly the spin wave function of an S-wave meson-antimeson system. By recoupling the wave function, we find that there are two cases that the $c\bar{c}$ spin cannot be 0: (a) the total spin of the system is larger than the maximum value of the total angular momentum of the light degree of freedom or smaller than the minimum one; (b) the spin and C-parity of the system are odd and positive, or even and negative, respectively, if the two mesons are different but belong to the same doublet. The heavy quark spin symmetry implies that the $c\bar{c}$ spin is conserved in the strong decay of the system, which may give some constraints on the decay channels.

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