On the role of one pion exchange and heavy quark spin symmetry in heavy meson molecules

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In this contribution we want to discuss the role of the one pion exchange potential and heavy quark symmetry in heavy meson molecules such as the \(X(3872)\) \cite{1} or the recently discovered \(Z_b(10610)\) and \(Z_b(10650)\) \cite{2}. By using techniques developed in atomic physics for handling power-law singular potentials \cite{3,4}, which have been also successfully employed in nuclear physics \cite{5}, we determine the range of center-of-mass momenta for which the one pion exchange potential is perturbative \cite{6}. In this momentum range, the one pion exchange potential can be considered a subleading order correction, leaving at lowest order a very simple effective field theory consisting only on contact-range interactions (basically \(X\)-EFT \cite{7} in the case of the charm sector). In this regard, non-perturbative one pion exchange is only required in the bottom isoscalar sector, a case for which the resulting effective field theory has been analyzed at lowest order for \(B\bar{B}^*/B^*\bar{B}\) molecules in Ref. \cite{8}. We also explore the consequences of heavy quark spin symmetry within the previous effective field theory approaches in different scenarios \cite{9}.

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