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 $X(3872)$ [1] or the recently discovered $Z_b(10610)$ and $Z_b(10650)$ [2]. By using techniques developed in atomic physics for handling power-law singular potentials [3,4], which have been also successfully employed in nuclear physics [5], we determine the range of center-of-mass momenta for which the one pion exchange potential is perturbative [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 [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. [8]. We also explore the consequences of heavy quark spin symmetry within the previous effective field theory approaches in different scenarios [9].

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