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Study of the $Z_b(10610)$, $Z_b(10650)$ states through $B\bar{B}^*$ and $B^*\bar{B}^*$ interactions using hidden local symmetry

Using the Hidden Local symmetry approach we study the $B\bar{B}^*$ and $B^*\bar{B}^*$ interactions for $I = 1$. We show that both interactions via one light meson exchange are OZI forbidden. For that reason, we calculate the contributions for those interactions coming from the exchange of two pions, interacting and noninteracting among themselves, and also due to the heavy vector mesons exchange. Then, to compare all these contributions, we use the potential related to the heavy vector exchange as an effective potential corrected by a factor which takes into account the contribution of the others light mesons exchange. In order to look for poles, this effective potential is used as the kernel of the Bethe-Salpeter equation. As a result, for the $B\bar{B}^*$ interaction we find a loosely bound state with mass in the range 10587–10601 MeV, very close to the experimental value of the $Z_b(10610)$ reported by Belle Collaboration. For the $B^*\bar{B}^*$ case, we find a cusp at 10650 MeV for all spin $J = 0, 1, 2$ cases.

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