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The $\rho(\omega)/B^*(B)$ system and bound states in the unitary local Hidden Gauge approach

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Collaboration

Abstract content

In this work we study the $\rho(\omega)B^*$ interaction using the local Hidden Gauge approach and a non-perturbative method. We search for poles in the T-matrix formalism, solving the factorized Bethe-Salpeter equation in coupled channels and identifying the different states as ρB^* bound states for all the possible spins, $J = 0, 1, 2$. We fit the parameters of the theory in order to reproduce the mass and width of an already existing state in the PDG with $I(J^P) = 1/2(2^+)$, the $B_2^*(5747)$, and the $J = 0, 1$ states are then predictions. We also calculate the ρB interaction in the local Hidden Gauge approach, which let us obtain an additional $J = 1$ state that can be identified with another PDG state, the $B_1(5721)$, and then we predict a width for this state. Since in the bottom sector we are considering heavy mesons, we discuss the relevance of Heavy Quark Spin Symmetry, and how it is or not reflected in the present formalism. As a main result in this aspect we mention here that all the states exhibit a near degeneracy in spin, and the leading order terms in the potential in the Heavy Quark Spin Symmetry power counting preserve the spin symmetry. These terms are the corresponding ones to light vector meson exchange in the Hidden Gauge, while the heavy meson exchange and contact terms are suppressed in the heavy quark mass power counting.
Based on "The $\rho(\omega)B^*(B)$ interaction and states of $J = 0, 1, 2$". Eur. Phys. J. C 76 (2016) 2, 82.

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