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D and B mesons masses in chiral perturbation theory with heavy quark symmetry

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The aspects of mesons containing a single heavy quark are governed by the spin symmetry $SU(2)_s$ of the heavy quark and the chiral symmetry $SU(3)_L \times SU(3)_R$ of the light quarks. Incorporating both approximate symmetries in a single framework was achieved by defining the heavy meson chiral perturbation theory (HMChPT).

The masses of D and B mesons are analysed within this effective theory including one-loop chiral and $O(m_Q^{-1})$ corrections.

The free parameters are determined in certain linear combinations using the physical values of D meson masses, light meson masses and coupling constants.

The fitted parameters are then used to predict the masses of the full set

of the low-lying B meson states. There is a good agreement between our theoretical predictions and the available experimental data on the masses of the ground state, $J^P = 0^-$ and $J^P = 1^-$, B mesons. For the first excited, $J^P = 0^+$ and $J^P = 1^+$, B mesons, our results may be helpful to experimentalists looking for such states.

Summary

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