Strong decay widths and mass spectra of charmed baryons

We calculate for the first time the total decay widths of the charmed baryons including all the possible open-flavor decay channels using the 3P0 model. Our calculations consider the final states: the charmed baryon-(vector/pseudoscalar) meson pairs and the (octet/decuplet) baryon-(pseudoscalar/vector) charmed meson pairs, within a constituent quark model. Furthermore, we calculate the masses of the charmed baryons ground states and their excitations up to the D-wave states. The charmed baryon masses are calculated likewise in a constituent quark model both in the three-quark and in quark-diquark schemes, utilizing a Hamiltonian model based on a harmonic oscillator potential plus a mass splitting term that encodes the spin, spin-orbit, isospin, and flavor interactions. The parameters of the Hamiltonian model are fitted to experimental data of charmed baryon masses and decay widths. The experimental uncertainties of the data affect the fitted model parameters, hence we thoroughly propagated these uncertainties into our predicted charmed baryons masses and decay widths via a Monte Carlo bootstrap approach, which is often absent in other theoretical studies on this subject. Our quantum number assignments and mass and strong partial decay widths predictions are in reasonable agreement with the available data and thus our results show the ability to guide future measurements at LHCb and Belle (II) experiments.

In-person participation

Yes

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