

Radiative M1 Decays of Heavy Flavor bottom Baryons in Effective Mass Scheme

Monday, 12 July 2021 16:45 (15 minutes)

We study flavor-conserving M1 radiative decays of heavy flavor bottom baryons in the framework of Effective Mass Scheme (EMS) within the quark model. The intent of the EMS lies in the fact that the masses of the quarks inside the baryon are modified as a consequence of one-gluon exchange interaction with the spectator quarks and it treats all the quarks at the same footing. The baryon mass can be written as the sum of the constituent quark masses and the spin-dependent hyperfine interaction among them. We show that EMS can successfully describe the masses and the magnetic moments, transition moments, and radiative decay widths of the lowest-lying singly heavy flavor baryons in a parameter independent way. The exchange contribution is worked out through interaction terms b_{ij} from the recently observed experimental masses for the heavy flavored charm and bottom baryons for the calculation of effective quark masses. We then compute the magnetic and transition moments of ground state $J^P = (1/2)^{+}$ and $J^P = (3/2)^{+}$, and $(1/2)^{+} \rightarrow (1/2)^{+}, (3/2)^{+} \rightarrow (1/2)^{+}$, and $(3/2)^{+} \rightarrow (1/2)^{+}$ heavy flavor charm and bottom baryon states. Finally, we make sturdy model independent predictions for radiative M1 decay widths of heavy flavored baryons. The radiative transitions between the states occur mainly through the M1-type, while there are negligible contributions from E2-type transitions, which are therefore ignored. We also extend our analysis to the triply heavy charm and bottom baryons.

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Session Classification: Quark Flavor and Precision Measurements

Track Classification: Quark Flavor and Precision Measurements