

Dynamics of radiative and strong decays of D_s -mesons

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We study the decays of the scalar $D_{s0}^*(2317)$ and axial-vector $D_{s1}^*(2460)$ charmed strange mesons in the hadrogenesis conjecture [1]. These mesons decay either strongly into the isospin-violating $\pi^0 D_s$ and $\pi^0 D_s^*$ channels or electromagnetically. They are generated by coupled-channel dynamics based on the leading order chiral Lagrangian. The effect of chiral corrections to chiral order Q_χ^2 is investigated. We show the sensitivity of the strong isospin-violating decays to both the coupled-channel dynamics and the consistent treatment of isospin-mixing effects. The one-loop contribution to the electromagnetic decay amplitudes of scalar and axial-vector states is calculated. The Lagrangian describing electromagnetic interactions is obtained by gauging the chiral Lagrangian for hadronic interactions and adding gauge-invariant correction terms to chiral order Q_χ^2 . We discuss the different contributions to the radiative decays and emphasize the large degree of destructive interferences among them required to achieve a consistent description of the measured branching ratios. The radiative decays calculated in this scheme point to the effectiveness of our interaction Lagrangian and to the dynamical role of light vector meson degrees of freedom in the electromagnetic transitions. Once the light vector mesons are included, a natural explanation of all radiative decay parameters is achieved. We stress the need for more accurate data expected from future hadron facilities.

[1] M.F.M. Lutz and M. Soyeur, arXiv:0710.1545 [hep-ph]

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