

Isospin-violation in the extended linear sigma model

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We study isospin-breaking effects in the extended linear sigma model (eLSM) for $N_f = 3$ quark flavors. The eLSM contains scalar, pseudoscalar, vector, and axial-vector mesons, which consist of quarks and antiquarks. It is constructed on the basis of a global chiral $U(N_f)_L \times U(N_f)_R$ symmetry which is spontaneously broken by a quark-antiquark condensate, as well as explicitly broken by the $U(1)_A$ anomaly of quantum chromodynamics and non-vanishing quark masses. Unequal masses for the non-strange and strange quarks lead to a splitting between the vacuum expectation values for the non-strange scalar-isoscalar field σ_N and the strange σ_S . Analogously, unequal masses for the up- and down quarks lead to a non-vanishing vacuum expectation value for the neutral scalar-isotriplet a_0^0 field. We explicitly compute the effect of isospin breaking on meson masses within the eLSM.

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