$f_0(980)$ and $a_0(980)$ mesons as hadronic molecules

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We discuss a possible interpretation of the $a_0(980)$ and $f_0(980)$ mesons as hadronic molecules - bound states of K and $\bar{K}$ mesons.

Because of the near degenerate $f_0(980)$ and $a_0(980)$ masses, an admixture of both states is taken into consideration which violates isospin conservation.

In order to describe the hadronic molecules we revert to a theoretical framework which was successfully applied in [1,2,3,4] and which is characterized by gauge invariance and covariance. In addition, it also allows for finite size effects due to the spatially extended structure of the f_0 and a_0 in the $K\bar{K}$-bound state picture. The coupling between the f_0 and a_0 mesons and its $K\bar{K}$ constituents is determined self-consistently by applying the compositeness condition.

Taking account of $a_0 - f_0$ mixing, we consider the strong $f_0(980) \to \pi\pi$ and $a_0(980) \to \pi\eta$ decays as well as the complete radiative decay properties with the final states occupied by photons and massive vector mesons ($f_0/a_0 \to \gamma\gamma$, $f_0/a_0 \to \gamma\omega$ and $f_0/a_0 \to \gamma\rho$) and ϕ-production.

Form factors governing the decays of the $f_0(980)$ and $a_0(980)$ are calculated by evaluating the kaon loop integrals. The predicted decay properties are studied with respect to variations of the $a_0 - f_0$ mixing angle and finite width effects.

Our estimates for the decay widths are in good agreement with available data and are also compared with results of other theoretical approaches such as quarkonium and tetraquark configurations.

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