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a0(980)−f0(980) mixing in χc1→π0f0(980)→π0π+π− and χc1→π0a0(980)→π0π0η

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Collaboration

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Abstract content

We study the isospin breaking in the reactions χc1→π0π+π− and χc1→π0π0η and its relation to the a0(980)−f0(980) mixing, which was measured by the BESIII Collaboration. We show that the same theoretical model previously developed to study the χc1→ηπ+π− reaction (also measured by BESIII), and further explored in the predictions to the ηc→ηπ+π−, can be successfully employed in the present study. We assume that the χc1 behaves as an SU(3) singlet to find the weight in which trios of pseudoscalars are created, followed by the final state interaction of pairs of mesons to describe how the a0(980) and f0(980) are dynamically generated, using the chiral unitary approach in coupled channels. The isospin violation is introduced through the use of different masses for the charged and neutral kaons, either in the propagators of the pairs of mesons created in the χc1 decay, or in the propagators inside the T matrix, constructed through the unitarization of the scattering and transition amplitudes of pairs of pseudoscalar mesons. We find that violating isospin inside the T matrix makes the π0η→π+π− amplitude nonzero, which gives an important contribution and also enhances the effect of the $K K^-$ term. Also, we find that in the total amplitude the most important effect is the isospin breaking inside the T matrix, due to the constructive sum of π0η→π+π− and $K K^-$→π+π−, which is essential to get a good agreement with the experimental measurement of the mixing.

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