WHY $X(3872)$ RESONANCE IS NOT A MOLECULE

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We discuss the scenario where the $X(3872)$ resonance is the $c\bar{c} = \chi_{c1}(2P)$ charmonium which “sits on” the $D^{*0}\bar{D}^0$ threshold.

We explain the shift of the mass of the $X(3872)$ resonance with respect to the prediction of a potential model for the mass of the $\chi_{c1}(2P)$ charmonium by the contribution of the virtual $D^*\bar{D} + c. c.$ intermediate states into the self-energy of the $X(3872)$ resonance. This allows us to estimate the coupling constant of the $X(7872)$ resonance with the $D^{*0}\bar{D}^0$ channel, the branching ratio of the $X(3872) \rightarrow D^{*0}\bar{D}^0 + c. c.$ decay, and the branching ratio of the $X(3872)$ decay into all non-$D^{*0}\bar{D}^0 + c. c.$ states. We predict a significant number of unknown decays of $X(3872)$ via two gluons: $X(3872) \rightarrow$ gluon gluon $\rightarrow$ hadrons.

We suggest a physically clear program of experimental research for verification of our assumption.

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