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Study of D_{03} and D_{30} dibaryons in a SU(3) chiral constituent quark model

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After the short introductions of the experimental findings of $d^*(2380)(D_{03})$ [1,2,3] and of several theoretical efforts to interpret its structure, the study of $d^*(2380)$ on the quark–gluon degrees of freedom is presented in this talk. Based on our SU(3) chiral constituent quark model, its mass, width, wave function, and partial widths of almost all possible strong decays are evaluated with the $\Delta\Delta + C_8C_8$ structure. We found that this dibaryon is strongly bounded due to the short range vector meson exchange potential. The obtained results reasonably agree with the data, which implies that the $d^*(2380)$ resonance could be assigned as a compact hexaquark system with the hidden-color component (C_8) being dominant. Moreover, its electromagnetic characteristics, such as the charge distribution, charge radius, multipole moment, and etc. are further calculated. Because of the sensitivity of these physical quantities to different interpretations of $d*(2380)$, some of those observables can be used as additional physical quantities to further distinguish the structures of $d^*(2380)$ [4]. In addition, its possible mirror state of D_{30} structure is also studied within the same approach. Our result shows that this possible dibaryon is a weakly bounded state and it has a sizeable hidden-color component as well. By comparing the results for the two dibaryons and the model parameter sets, the effects of one gluon exchange and vector meson exchange terms in our approach are discussed [5].

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Authors: DONG, Yubing (Institute of High Energy Physics, Chinese Academy of Sciences, P. R. China); Prof. L\"U, Qi-Fang (Department of Physics, Hunan Normal University, Changsha 410081, China)

Presenter: DONG, Yubing (Institute of High Energy Physics, Chinese Academy of Sciences, P. R. China)

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