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Masses of T_{4c} tetra quark state in a relativistic formalism

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After the discovery of X(3872) many new and unexplained X Y Z states have been discovered experimentally in recent times [1]. It has helped in our faith towards the existence of multi quark states. Most of these unknown states consist of hidden heavy quark anti quark pair with combinations of quark/antiquark in the lighter sector (cq$\bar{c}$ $\bar{q}$or bq$\bar{b}$ $\bar{q}$ where q ϵ u, d, s). However, the tetra quark state containing all heavy flavor like T_{4Q} (Q ϵ c, b, $\bar{c}$ and $\bar{b}$) has not been investigated rigorously. So we have selected a single flavor (all charm) tetra quark system to study the mass spectra and hadronic decays. Based on diquark - antidiquark model we have developed a relativistic approach to study exotic hadron spectroscopy, where in, the four body system is considered as three subsequent two body systems. We have solved Dirac equation by using Cornell like confinement potential for two body Interaction and for the construction of tetra quark system (cc$\bar{c}\bar{c}$). The Spin dependent parts are also employed to understand the splitting structure of tetra quarks. The contribution of each term is well analyzed. Our predicted mass for first radially excited state with J^{PC} value 0^{++}, 1^{+-}, 2^{++} are 6.495, 6.595 and 6.68 which are in a good agreement with other theoretical model predictions [2]. More experiments and theoretical attempts are required to understand the interactions and nature of all heavy tetra quark states. We hope that forthcoming experiments such as Belle II and LHC at 13 TeV gives more information about doubly hidden charm tetra quark hadronic state.

Key words: All charm tetra quark, diquark –diantiquark model, Dirac formalism and mass spectra

1. Lu Zhao, Wei-Zhen Deng, and Shi-Lin Zhu1, Phys. Rev. D 90, 094031 (2014).
2. Wei Chen, Hua-Xing Chen, Xiang Liu, T. G. Steele, and Shi-Lin Zhu. arXiv:1605.01647v1 [hep-ph] 5 May, 2016

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