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## Charmonium spectrum from the instanton liquid model

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The structure of charmonia is usually described by two important physics: Coulomb-like potential arising from one-gluon exchange and quark-confining one to keep the quarks inside charmonia. However, the strength of the strong coupling constant often employed in this potential approach is known to be overestimated. While the effects from the instanton, which is one of the most well-known nonperturbative object in QCD, are of great importance to describe light hadrons, they are suppressed in the heavy-quark sector. Nevertheless, the heavy-quark potential derived from the instanton vacuum provides certain contribution to the masses of charmonia such that almost the physical value of the strong coupling constant can be used. In the present talk, we present recent studies on the instanton effects on the charmonia. These effects influence also the Coulomb-like interaction from one-gluon exchange. Combining the existing terms in the heavy-quark potential with those from the instanton vacuum, We obtain the mass spectrum of the charmonia. We also present the results for the  $E1$  and  $M1$  radiative transitions.

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