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Heavy quarkonia description from a generalized screened potential model

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From lattice results a new non relativistic quark model to calculate the spectrum of heavy quark mesons has been developed. Te model interaction is generated from the identification of E(r), the energy of two static color sources, Q and antiQ, in terms of the Q-antiQ distance, calculated in the lattice, with the sum of the masses of the Quark (m_{Q}) and the antiQuark (m_{antiQ}) plus the static Q-antiQ potential V(r). Thus one gets V(r)=E(r)-m_{Q}-m_{antiQ}. By using this potential in the Schródinger equation the heavy quarkonia spectra is calculated and compared to data.
In the so called quenched approximation (only the bare valence Q_0-antiQ_0 configuration) lattice results for E(r) give rise to a Cornell potential form (see for example <cite>Bal01</cite>) which has been widely used in the literature to evaluate heavy quarkonia spectra (see for example <cite>Eic08</cite> and references therein).
When the coupling to meson (Q-anti$_0$q) - meson (antiQ_0-q) configurations is implemented the form of E(r) is altered by screening effects <cite>Bal05</cite>. By interpreting E(r) as the energy of a dressed quark (Q)-dressed antiquark state the corresponding Q-antiQ interaction incorporates the effect of meson (Q_0-antiq) - meson (antiQ_0-q) configurations. The resulting potential, called Generalized Screened Potential (GSP), preserves the Cornell form but modulated by meson-meson thresholds <cite>Gon14</cite>. A richer spectrum (bigger number of bound states) than the one resulting from the non-screened Cornell potential is obtained. In charmonium some of these extra states may be assigned to new charmonium states, in particular a quite resonable description of the masses of X type resonances is obtained.

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