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التمائل المغربي للكوارك الثقيل و الميزونات الثقيلة

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Abstract : Dirac Hamiltonian to order u^2/c^2 has been used to study the mass spectrum of q Q bound system. We have calculated the energy levels for $1s$ and $1p$ states by variational method using Gaussian wave functions. By taking two models into consideration we have obtained mass difference of P-wave 0 , O_s and B_s mesons. The agreement between our predictions and the experimental values is good (within 5-10 MeV). Also we have predicted $m_{D^*} = 5.437$ GeV by using the experimental value $m_{B_s} = 5.375$ GeV. Masses for these mesons have been calculated. We found that the classes of m and m_D are in agreement with their experimental values in the two models. But the predictions for the masses m_{D^*} and m_{D^*} are quite different. Our results for the mass m_D are not very different from 5, the experimental values. Therefore the existing experimental data do not distinguish between these two models. Finally we have evaluated $E1$ decay rates for p-wave O_s and B mesons. Also we have evaluated them for D mesons with and without the recoil correction in the non-relativistic quark model. We should note that no experimental data are available on these decay rates. So $E1$ predictions can not be tested at present.

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