

Quantum Physics

Any l-state improved quasi-exact analytical solutions of the spatially dependent mass Klein-Gordon equation for the scalar and vector Hulthen potentials

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We present a new approximation scheme for the centrifugal term to obtain a quasi-exact analytical bound state solutions within the framework of the position-dependent effective mass radial Klein-Gordon equation with the scalar and vector Hulthén potentials in any arbitrary D dimension and orbital angular momentum quantum numbers l . The Nikiforov-Uvarov (NU) method is used in the calculations. The relativistic real energy levels and corresponding eigenfunctions for the bound states with different screening parameters have been given in a closed form. It is found that the solutions in the case of constant mass and in the case of s-wave ($l=0$) are identical with the ones obtained in literature.

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