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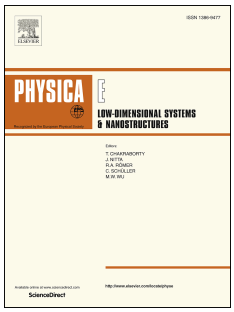

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How the inter-electronic potential Ansätze affect the bound state solutions of a planar two-electron quantum dot model

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Abstract

The model of a two-electron quantum dot, confined to move in a two dimensional flat space, in the presence of an external harmonic oscillator potential, is revisited for a specific purpose. Indeed, eigenvalues and eigenstates of the bound state solutions are obtained for any oscillation frequency considering both the $1/r$ and $\ln r$ Ansätze for inter-electronic Coulombic-like potentials in $2D$. Then, it is pointed out that the significative difference between measurable quantities predicted from these two potentials can shed some light on the problem of space dimensionality as well as on the physical nature of the potential itself.

Keywords: Schrödinger equation, quantum dot model, planar system, space dimensionality, Numerov numerical method.

1. On the two Ansätze

How Physics is affected by space-time dimensionality is a general question that is gaining prominence due to strong developments in Unified Theories and in Planar Physics.

All the attempts trying to fix or understand space dimensionality [1] which depends on the form of physical potential has to face an insurmountable episte-

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