

Energy-Level Structure of a Confined Electron-Positron Pair in Nanostructure

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Abstract : The energy-level structure of a pair of electron and positron confined in a quasi-one-dimensional nano-scale potential well has been investigated focusing on its trend in the small limit of confinement strength ω , namely, the Wigner molecular regime. An anisotropic Gaussian-type basis functions supplemented by high angular momentum functions as large as $l = 19$ has been used to obtain reliable full configuration interaction (FCI) wave functions. The resultant energy spectrum shows a band structure characterized by ω for the large ω regime whereas for the small ω regime it shows an energy-level pattern dominated by excitation into the in-phase motion of the two particles. The observed trend has been rationalized on the basis of the nodal patterns of the FCI wave functions.

Keywords : confined systems, positron, wave function, Wigner molecule, quantum dots

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