

Four-Electron Systems in a Coupled Double-Layer Quantum Dots

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Abstract: Making use of the method of few-body physics, the energy spectrum of a four-electron system consisting in a vertically coupled double-layer quantum dot as a function of the strength of a magnetic field is investigated. Discontinuous ground-state transitions induced by an external magnetic field are shown. We find that, in the strong coupling case, the ground-state transitions depend not only on the external magnetic field B but also on the distance d between double-layer quantum dots. However, in the case of weak coupling, the ground-state transitions occur in the new sequence of the values of the magic angular momentum. Hence, the interlayer separation d and electron-electron interaction strongly affect the ground state of the coupled quantum dots.

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