Donor Centers in a Gaussian Potential

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Abstract: We study a neutral donor center (D^0) and a negatively charged donor center (D^-) trapped by a quantum dot, which is subjected to a Gaussian potential confinement. Calculations are made by using the method of numerical diagonalization of Hamiltonian within the effective-mass approximation. The dependence of the ground state of the neutral shallow donor and the negatively charged donor on the dot size and the potential depth is investigated. The same calculations performed with the parabolic approximation of the Gaussian potential lead to the results that are qualitatively and quantitatively different from each other.

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