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Tunneling-induced self-energy shift of energy levels of a quantum dot

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Abstract

© Published under licence by IOP Publishing Ltd. The self-interaction of a quantum dot tunnel with Coulomb interaction coupled to two noninteracting leads is investigated. The self-energy function describing this interaction is added to a bare energy of a dot state. In the standard way of determining the self-interaction (tunneling-induced) corrections to bare energies of emitters (atoms, quantum dots, etc) the variations of the self-energy functions with energy are ignored, and these corrections are considered to be equal to the values of the self-energy functions for bare energies of states. We show that actually in the case of quantum dots the variations of the self-energy functions in the energy interval between the bare and true energies can be strong, and this can have a significant effect on the values of the tunneling-induced shifts of energy levels of quantum dots.

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