

A Quantum Scattering-Interference Process That Could Improve the Thermoelectric Efficiency in a System of Coupled Interacting Quantum Dots: Possible Manifestations in Optical Properties

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Abstract:

Recently we studied a system of two coupled quantum dots (QDs) with strong but finite electronic correlation [1], that in specific conditions [2], permits optimize the thermoelectric efficiency (TE) [1]. Basically, we describe a quantum scattering interference process (QSIP) that origin a final quantum state-bound in the continuum (BIC), arising quasi-BICs [1] linked to it, which satisfied the “characteristics” described by Mahan and Sofo to obtain “the best thermoelectric” [3]. In this work we compute the electronic contributions to optical properties (photoemission spectroscopy (PES) and inverse photoemission spectroscopy (IPES)) in the conditions that enhances the TE, obtaining “particularities” in PES and IPES that could orientate the experimental research of our theoretical predictions. Additionally, we study the local Green’s function self-energy characteristic at the Fermi-level -at low temperatures-, showing that is present a non-Fermi liquid (NFL) behavior when the TE grows significantly [4], that NFL character is manifested too by the electrical resistivity results. We studied another QDs geometrical configuration, looking for an effective QSIP that could enhance the TE, and the arise of BICs -thermally activated-, linked with the optimization process of the TE. We explore the possible topological characteristics [5] of these TE enhancing-BIC’s process.