Manifestation of fermi edge singularity in co-tunnelling regime

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Abstract

The Fermi edge singularity (FES) is a prominent manifestation of the Coulomb interaction. It can be observed in a controllable way in systems consisting of quantum dot (QD) electrostatically coupled to the leads. The tunnelling density of states (DOS) in this case acquires an algebraic dependence on the energy of the level at QD with universal power determined by the scattering phases in the transport channels on the QD potential. In this work we study how FES affects higher-order tunnelling processes (co-tunnelling). Such setup allows studying of the dependence of the DOS on two energy scales. The behaviour of the current through the QD on the energy of the QD level and on the bias between the leads obtained for the limit of large and small bias. As well as for the sequential tunnelling in these limiting cases DOS depends algebraically on both energy scales with new universal powers determined by the interaction.

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