"CHARGE SENSING" EFFECTS IN CONDUCTANCE THROUGH QUANTUM DOTS AND POINT CONTACTS

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We investigate the influence of charge dynamics on electronic transport through large quantum dots (QD) and point contacts (QPC). Because of the complex energetic structure of the large dot and high anisotropy of hybridization of its levels with electrodes, some electron charge can be accumulated within the dot area. It influences in capacitative way the active in transport levels, which is manifested by saw-like pattern in the conductance curve. This effect is called "charge sensing". Additionally, when a small hybridization is present between transmitting channel and levels accumulating charge, Fano resonances emerge in conductance. Their shape is also influenced by charge sensing. We derive this effect starting from microscopic Hamiltonian. Similar effects have been also experimentally observed in conductance through QPC when a QD is present in the close vicinity of QPC. Our calculations are in good correspondence with these data and capture the basic physics behind.

9.7 cm

13.4 cm

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