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Antiresonant quantum transport in AC-driven molecular nanojunctions

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In this talk the electric charge current flowing through a vibrating molecular nano-junction, which is driven by a modulated external voltage, in its regime of nonlinear oscillations is discussed. In this setup, without loss of generality, we model the junction by a vibrating molecule, which is doubly clamped to two metallic leads which are biased by time-periodic AC voltages. Dressed-electron tunneling between the leads and the molecule drives the mechanical degree of freedom out of equilibrium. In the deep quantum regime, where only a few vibrational quanta are excited, the formation of coherent vibrational resonances affects the dressed-electron tunneling. In turn, back action modifies the electronic ac current passing through the junction. The concert of nonlinear vibrations and AC driving induces quantum transport currents, which are anti-resonant to the applied AC voltage. Quantum back action on the flowing out of equilibrium current allows us to get rather sharp spectroscopic information on the population of the mechanical vibrational states.

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