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Vibrational mode mediated electron transport in molecular transistors DEBORAH SANTAMORE, Department of Physics, Temple University, Philadelphia, PA, NEILL LAMBERT, FRANCO NORI, Advanced Science Institute, RIKEN, Japan — We investigate the steady-state electronic transport through a suspended dimer molecule coupled to leads. When strongly coupled to a vibrational mode, the electron transport is enhanced at the phonon resonant frequency and higher-order resonances. The temperature and bias determines the nature of the phonon-assisted resonances, with clear absorption and emission peaks. The strong coupling also induces a Frank-Condon-like blockade, suppressing the current between the resonances. We compare an analytical polaron transformation method to two exact numerical methods: the Hierarchy equations of motion and an exact diagonalization in the Fock basis. In the steady-state, our two numerical results are an exact match and qualitatively reflect the main features of the polaron treatment. Our results also indicate the possibility of compensating the current decrease due to the thermal environment.

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