Abstract Submitted
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Interaction effects in electric transport through self-assembled molecular monolayers MARTIN LEIJNSE, Center for Quantum Devices, Niels Bohr Institute, University of Copenhagen — I will discuss a theoretical study of electric transport in molecular electronic devices based on self-assembled molecular monolayers (or other devices involving a large number of mesoscopic conductors contacted in parallel). In contrast to macroscopic conductors, Coulomb interactions between charge carriers being transported through neighboring molecules within the monolayer are large. I show that such inter-molecular Coulomb interactions not only lowers the conductance level, but lead to a correlated current and give rise to distinct signatures in the current-voltage characteristics. If some molecules fail to bond strongly to both electrodes, interactions can even give rise to negative differential resistance. Knowledge of the effects of Coulomb interactions between different conductors is important not only for the functionality of nanoelectronic devices, but also to isolate the genuine single-device properties, for example when trying to interpret a transport experiment using a molecular monolayer device in terms of single-molecule properties. Reference: Martin Leijnse, arXiv:1210.2843

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