physikalisches Kolloquium

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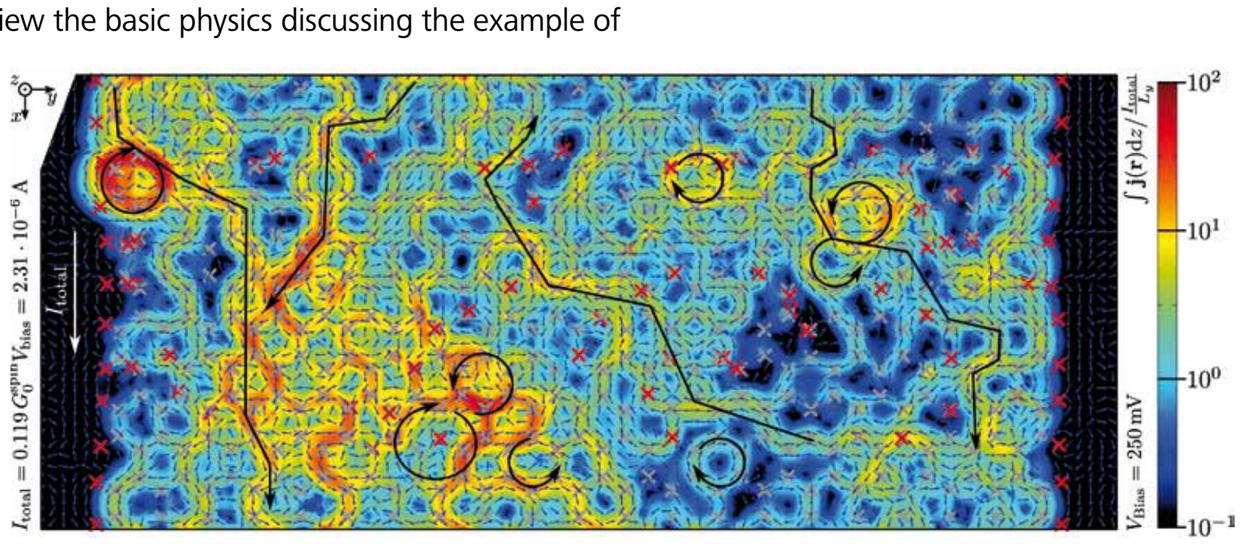
Quantum Transport in Molecular Nanostructures

Mo. 01.02.16
16:00 Uhr
Ort: H34

Hybrids between molecular matter and a metallic embedding are a crucial ingredient of much of todays and tomorrows technology. Prototypical examples comprise catalysis, organic photovoltaics and graphene-based technologies. Key questions in this diverse research area concern how charge, spin and heat flow through the nanostructure and how this flow can be manipulated. In the course of answering such questions, a variety of new physical phenomena have been and still are being discovered.

The first part of the talk will focus on the flow of charge through flakes of graphene. Of particular interest are flakes functionalized with adsorbed adatoms. It turns out that the typical current can exceed the mean by an order of magnitude due to the formation of eddies. Possible consequences of this observation will be discussed.

The second part of the talk will be devoted to charge flowing through single molecules. Motivated by recent experiments we will review the basic physics discussing the example of oligoacenes. They will also lead us to consider effects of strong correlations, such as the Kondo effect. Molecular systems that could provide a unique framework to discover completely new and exotic types of Kondo physics will be proposed at the end of the talk.



Above: Distribution of local currents flowing through a (armchair) graphene ribbon. It is 40 carbon atoms wide and has been functionalized with 20% hydrogen coverage. A net current is flowing from top to bottom. As indicated by the arrows, on a local scale the average current cannot be resolved; due to the presence of eddies in large areas of the sample the typical local current exceeds the average current by factor of five.