PHYSIKALISCHES KOLLOQUIUM

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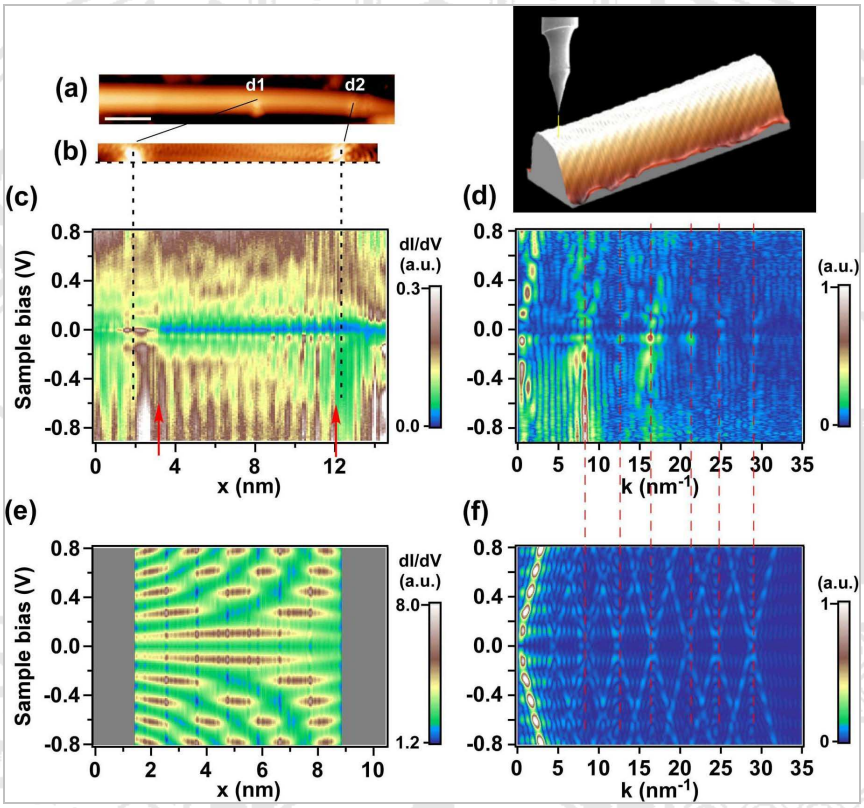
IM GROßEN HÖRSAAL



QUANTUM TRANSPORT IN DEFECTED CARBON-NANOTUBES

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A single-walled carbon nanotube is a piece of graphene - a single layer of carbon atoms arranged in a honeycomb lattice - rolled into a hollow cylinder with nanometric diameter and micrometric length. Nanotubes have attracted a continuously increasing interest of scientists in view of the possibility to study new and previously unexplored phenomena peculiar to one-dimensional metallic conductors.
In this talk I shall present a detailed comparison between theoretical predictions on electron scattering processes in metallic single-walled carbon nanotubes with defects and experimental data obtained by scanning tunnelling spectroscopy of nanotubes irradiated with Ar-ions. The theoretical model that I shall present reproduces the features of the particle-in-a-box-like states observed experimentally. Furthermore, the comparison between theoretical and experimental local density of states yields clear signatures for inter- and intra-valley electron scattering processes depending on the tube chirality.
For the case of armchair single-walled carbon nanotubes, electron scattering depends on the interplay between tube and defect symmetries. Particularly, I shall show that the conservation of the pseudo-spin and particle-hole symmetries plays a crucial role. These last results pave the way for a possible pseudo-spin filter device.