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Orbital Kondo Effect and Spin Polarization in Carbon Nanotubes

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In this talk I will review our recent experiments on low-temperature electronic transport in carbon nanotube (CNT) quantum dots (QDs). I will focus, in particular, on strongly coupled quantum dots exhibiting Kondo effect. By means of a magnetic field we are able to modify the energy spectrum of CNT QDs, such that we can tune two orbital states with equal spin polarization into degeneracy. This purely orbital degeneracy enables the observation of an orbital Kondo effect and shows that carbon nanotubes can potentially act as low-impedance spin filters. At zero magnetic field, the four-fold degeneracy of the nanotube spectrum allows to observe a strong Kondo effect, with new transport properties in the non-linear regime and described theoretically by a so-called SU(4) symmetry.