Keynote

Discrete symmetries and the Kondo Effect in Clean Carbon Nanotubes

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Ultraclean carbon nanotubes form quantum dots of well-defined atomic structure at low temperatures. Transport spectroscopy of ground and excited states as a function of electron numbers in a parallel magnetic field results in detailed information about the band structures, in particular on spin-orbit and KK'-mixing effects. This information is exploited in the analysis of the SU(4) Kondo effect [1] occurring at larger electron numbers, where the devices become more transmissive. The slightly broken fourfold degeneracy in our device gives rise to satellites of the Kondo peak that shift in a characteristic way in perpendicular and parallel magnetic field. Our observations can be understood in terms of the discrete symmetries of the carbon nanotubes, and are well reproduced by state of the art theoretical modeling [2].

References

[1] P. Jarillo-Herrero et al., Nature 434, 484 (2005).
[2] S. Smirnov and M. Grifoni, Phys. Rev. B 87, 121302 (2013).