Seminarankündigung

Dienstag, 23. Januar 2018
17:15 Uhr

WSI, Seminarraum S 101

“Helical states, spin-orbit coupling, and phase-coherent transport in InAs nanowires”

Semiconductor nanowires, fabricated by a bottom-up approach, are very promising as building blocks for future nano-scaled electronic and spintronic devices. In addition, they are also very interesting objects for studying fundamental quantum phenomena, such as Majorana physics. The latter was recently found to be relevant for the realization of future fault-tolerant quantum computers. In this respect spin-orbit coupling plays an important role, since it is essential to form a so-called helical gap, one of the prerequisites to create Majorana states. In InAs nanowires spin-orbit coupling is relatively strong, owing to the lack of inversion symmetry and the low band gap. Two types of spin-orbit coupling are relevant, i.e. spin-orbit coupling due to structural inversion asymmetry (Rashba effect) and bulk inversion asymmetry (Dresselhaus contribution). Experimentally, information on spin-orbit coupling is gained by weak-antilocalization measurements. These results are fitted to a theoretical model, in order to quantify the strength of the Dresselhaus as well as the Rashba contribution. On high mobility InAs nanowires distinct conductance steps due to quantized conductance are observed. We found indications of a helical gap indicated by the dip feature in the first conductance plateau.

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