Seminarankündigung

Dienstag, 15. Februar 2011

17:15 Uhr

WSI, Seminarraum S 101

“Modelling electronic properties of core-shell nanowires”

Epitaxially grown core-shell nanowires (CS-NW) have the potential to confine a high-quality electron gas at the heterointerface or in a *bented* quantum well overgrown on a free-standing nanowire which serve as a substrate. Such a bented electronic system may enhance the wealth of new physics uncovered in traditional planar high-mobitity 2D electron gases, as well as being a candidate for phase-based electronic devices and photovoltaic applicationsI will discuss modeling of CS-NW starting form idealized cylindrical electronic system, to CS-NWs with the discrete *n*-fold symmetry of the underlying free-standing NWs used as a substrate. This effect, which can be included by a geometric potential to mimic topological effects at the bent of the overgrown quantum well, lead to preferential localization at the edges of the CS-NW. Accordingly, the system behaves as a set of *n* tunnel-coupled 1D channels, where tunneling can be controlled by structure engineering. Characteristic Ahronov-Bohm oscillations exposing the underlying *n*-fold symmetry, and Landau level formation as a function of the field direction point to very rich magneto-transport characteristicsWhile these calculations assumed that electronic confinement is enforced in a thin quantum well grown around a NW, self-consistent calculations of the electron gas in doped samples are required to investigate the possible formation of heterojunctions. The self-consistent field which is obtained shows i) formation of an accumulation layer at the heterointerface ii) spontaneous preferential localization and channel formation at the edges of the NWFinally the excitonic resonance will be discussed, focusing on the effect of the complex dielectric modulation in these samples showing to which extent the exciton resonance can be tuned by structure design and proper choice of the dielectric media.

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