



GP-spin (Graduate Program in Spintronics) Seminar

"Spin-orbit coupling and coherent quantum states in InAs-based nanowires"

日 時 : 2016年 7月 1日 (金) 13:00~14:30

場 所 : 工学研究科マテリアル・開発系 教育研究棟

セミナー室2 (4F 407室)

講演者 : Prof. Dr. Thomas Schäpers

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[Abstract]

Semiconductor nanowires, fabricated by a bottom-up approach, are very promising as building blocks for future nanoscaled electronic devices. In addition, they are also very interesting objects for studying fundamental quantum phenomena. On InAs nanowires controlled by a set of top-gate electrodes ballistic transport was investigated. By varying the gate voltage distinct conductance steps due to quantized conductance were observed. By means of bias-dependent measurements at various magnetic fields the g -factor was extracted. We also found indications of a helical gap in the last conductance step. The presence and strength of spin-orbit coupling was determined by weak-antilocalization measurements. We furthermore investigated GaAs/InAs core/shell nanowires, where the highly conductive InAs shell is wrapped around an insulating GaAs core nanowire. These nanowires were grown by molecular beam epitaxy. At low temperatures pronounced flux periodic (h/e) magnetoconductance oscillations are observed, when the magnetic field is oriented along the nanowires axis. These very regular oscillations are explained by the formation of closed-loop quantum states in the tube-like InAs shell comprising a flux periodic energy spectrum. The magnetoconductance oscillations are even observed at temperatures as high as 50K.