



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.