TECHNISCHE UNIVERSITÄT CHEMNITZ

PHYSIKALISCHES KOLLOQUIUM

Mittwoch, den 09.11.2011, um **17:15 Uhr**

Ort: Reichenhainer Str. 90; Neues Hörsaalgebäude, Raum: 2/N013

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Spin currents in nanostructures

The quantum mechanical spin of the charged electron provides an additional degree of freedom pertinent to, e.g., quantum information processing or spintronics. Spin currents hold the potential of easy controllable, fast manipulation and of low dissipation compared to charges. Spin-orbit coupling and hyperfine interactions can severely impair spin lifetimes, therefore shifting interest from III-V semiconductors to silicon or carbon-based materials. Pure spin currents in nanostructures are generated by means of non-local spin valves, in which the spin injection path is separated from the voltage detection channel. For example in nanostructures of graphene using mechanically exfoliated1 or large-area CVD grown2 bilayer samples we observe at 300 K and 5 K spin relaxation lengths of 1 – 3 µm and spin relaxation times of the order of 2 ns. For this latter limitation extrinsic spin-orbit coupling effects due to charged impurities are responsible at present. The spin scattering mechanism is identified as of the D'yakonov-Perel'-type, contrary to the Elliott-Yafet mechanism found in single layer graphene. Spintronic devices depend severely on improvements in process technology.

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1 T.- Y. Yang, J. Balakrishnan, F. Volmer, A. Avsar, M. Jaiswal, J. Samm, S. R. Ali, A. Pachoud, M. Zeng, M. Popinciuc, G. Güntherodt, B. Beschoten, and B. Özyilmaz, Phys. Rev. Lett. 107, 047206 (2011).
2 A. Avsar, T.-Y. Yang, S. Bae, J. Balakrishnan, F. Volmer, M. Jaiswal, Z. Yi, S.R. Ali, Gernot Güntherodt, B.H. Hong, B. Beschoten, and B. Oezyilmaz, Nano Lett. 11, 2363 (2011).

Alle Zuhörer sind ab 17:00 Uhr zum Kaffee vor dem Hörsaal eingeladen.