HL 78: Invited Talk Mariusz Ciorga

Time: Thursday 12:30–13:00 Location: ER 164

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Electrical spin injection into high mobility 2DEG systems

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Effective spin injection into two-dimensional (2D) electron systems is a prerequisite for many new functionalities in future devices, with a Datta-Das spin field effect transistor [1] being a primary example. Whereas real progress in understanding of spin injection phenomena in bulk semiconductors has been achieved, electrical injection of spins into high mobility 2D systems remains a relatively open matter.

Here I present the results of our recent experiments [2] on electrical spin injection into high mobility 2D electron gas (2DEG) confined in an inverted AlGaAs/GaAs heterojunction, with ferromagnetic semiconductor (Ga,Mn)As employed as a spin polarizing material. We observed a clear nonlocal spin signal that could be tuned by a voltage applied across the injector. At maximum the signal largely exceeded the prediction of the standard drift-diffusion model. A strong correlation of this enhancement with the width of the contacts and with the electrons' mean free path led us to the conclusion that ballistic nature of the transport in the 2D region directly below the injector should be considered to fully describe the experimental outcome.

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[1] S. Datta and B. Das, Appl. Phys. Lett. **56**, 665 (1990) [2] M. Oltscher *et al.*, Phys. Rev. Lett. **113**, 236602 (2014)