MAR11-2010-000297

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

**Detecting excitation and magnetization of individual dopants in a semiconductor two-dimensional electron gas**[1]

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Magnetic atoms doped into a semiconductor are the building blocks for bottom up spintronic and quantum logic devices. They also provide model systems for the investigation of fundamental effects. In order to correlate the dopant's atomic structure with its magnetism magnetically sensitive techniques with atomic resolution are a prerequisite. Here, I show electrical excitation and read-out [1] of single magnetic dopant associated spins in a two-dimensional electron gas (2DEG) confined to a semiconductor surface [2] using spin-resolved scanning tunneling spectroscopy [3]. I will review our real-space study of the quantum Hall transition in the 2DEG [2] and of the magnetic properties of the dopants [1]. Finally, I will demonstrate that the dopant serves as an atomic scale probe for local magnetometry of the 2DEG. This work was done in collaboration with A. A. Khajetoorians, B. Chillian, S. Schuwalow, F. Lechermann, K. Hashimoto, C. Sohrmann, T. Inaoka, F. Meier, Y. Hirayama, R. A. Römer, M. Morgenstern, and R. Wiesendanger.

[1] A. A. Khajetoorians *et al.*, Nature **467**, 1084 (2010).
[2] K. Hashimoto *et al.*, Phys. Rev. Lett. **101**, 256802 (2008).
[3] J. Wiebe *et al.*, Rev. Sci. Instrum. **75**, 4871 (2004).

[1]We acknowledge financial support from ERC Advanced Grant "FURORE", by the DFG via SFB668 and GrK1286, and by the city of Hamburg via the cluster of excellence "Nanospintronics".