HL 28 Hauptvortrag Hägele

Zeit: Samstag 14:15–15:00 Raum: TU P270

Hauptvortrag HL 28.1 Sa 14:15 TU P270

Electron spin relaxation in semiconductors — •Daniel Hägele, Stefanie Döhrmann, Jörg Rudolph, and Michael Oestreich — Universität Hannover, Institut fürFestkörperphysik, Abteilung Nanostrukturen, Appelstr. 2,D-30167 Hannover

Magnetoelectronics in metals has led to breakthroughs in computer hard disk technology, non-volatile magnetic memory (MRAM). MRAM technology also offers prospects for integrating magnetologic. Semiconductor spinelectronics on the other hand is still in its infancies. This new electronics seeks to combine the exceptional advantages of magnetoelectronics with the highly developed semiconductor technology. Long spin lifetimes are a prerequisite for spintronics to work. Therefore, a detailed understanding of spin relaxation mechanisms is required to develop design rules for spintronic devices with optimized spin lifetimes. Recently, suppression of the prominent Dyakonov-Perel spin relaxation mechanism has been found in heterostructures with special orientation of crystal axes making them prime candidates for spintronic applications at room temperature. We show experimentally that spin lifetimes in such structures depend critically on spin orientation. In GaAs quantum wells grown on (110) oriented substrate the spin lifetime of spins oriented in the plane is found to be dramatically reduced by a factor of ten compared to spins along the growth direction. For wide quantum wells a novel electron spin relaxation mechanism due to intersubband scattering is identified that limits the spin lifetime at elevated temperatures also in the direction of longest spin lifetimes [1].

[1] S. Döhrmann *et al.*, Phys. Rev. Lett. **93**, 147405 (2004)