

HL 38: Invited Talk Korn

Time: Thursday 10:15–11:00

Location: ER 270

Invited Talk

HL 38.1 Thu 10:15 ER 270

Spin dynamics in high-mobility 2D electron systems: effects of electron-electron interaction and anisotropy — •TOBIAS KORN¹, DOMINIK STICH¹, NATALIE STEFFEK¹, DIETER SCHUH¹, WERNER WEGSCHEIDER¹, MING-WEI WU², and CHRISTIAN SCHÜLLER¹— ¹Institut für Experimentelle und Angewandte Physik, Universität Regensburg — ²University of Science and Technology of China, Hefei

Understanding the spin dynamics in semiconductor heterostructures is highly important for future semiconductor spintronic devices. In high-mobility 2D electron systems (2DES), the spin lifetime strongly depends on the initial degree of spin polarization due to the electron-electron interaction. By time-resolved Faraday rotation (TRFR) techniques,

we demonstrate that the spin lifetime is increased by an order of magnitude as the initial spin polarization degree is raised from the low-polarization limit to several percent[1,2]. Additionally, the spin lifetime in 2DES is strongly anisotropic if the Rashba and Dresselhaus spin-orbit fields are of the same order of magnitude. By comparing TRFR measurements in an in-plane magnetic field to numerical simulations, we are able to determine both, the Rashba and the Dresselhaus terms with high accuracy. Using these values, we can infer an in-plane anisotropy of the spin lifetime of about 60 to 1, with a maximum in-plane spin lifetime of several nanoseconds [3].

[1] Stich et al., Phys. Rev. Lett. **98**, 176401 (2007).

[2] Stich et al., Phys. Rev. B **76**, 205301 (2007).

[3] Stich et al., Phys. Rev. B **76**, 073309 (2007).