## InAs spin-filter cascades in magnetic fields

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To utilize the charge and the spin of an electron together in the field of spintronics, efficient generation and detection of spin-polarized currents is mandatory. One can achieve generation and detection injecting a spin-polarized current from a ferromagnet into a semiconductor and extracting it again into a ferromagnet. However, scattering at the interface and the conductivity mismatch between the ferromagnet and the semiconductor inhibit a sufficient polarization of the injected current. These obstacles can be bypassed creating spin-polarized currents in a Y-shaped all-semiconductor spin filter using the intrinsic spin Hall effect (iSHE) as the spin seperating agent. By cascading two such filters the second filter's outputs reveal the spin polarization at its input as a conductance difference[1]. We present transport measurements under the influence of an out-of-plane magnetic field to get insights into the mechanism as well as the strength of the iSHE. In-plane magnetic fields add to the effective Rashba fields and thus change the spin precession length. This allows studies on the iSHE and the so-called Zitterbewegung, that is a combination of the iSHE and the spin precession[2].

[1]J. Jacob, G. Meier, S. Peters, T. Matsuyama, U. Merkt, A. Cummings, R. Akis and K. Ferry, J. Appl. Phys. **105**, 093714 (2009).
[2]P. Brusheim and H.Q. Xu, arXiv:0810.2186v2 [cond-mat.mes-hall] (2009)