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Top- and Side-Gated InAs Spinfilter Cascades in Magnetic Fields JAN JACOB, HAUKE LEHMANN, TILL BENTER, ALEXANDER BUHR, JENS KIENITZ, ULRICH MERKT, Universitaet Hamburg, Institut fuer Angewandte Physik — We present results from transport experiments on two-stage Y-shaped spin-filter cascades fabricated from InAs heterostructures. The first Y junction acts as a generator of two oppositely spin-polarized currents by employing the intrinsic spin-Hall effect. When the second filter that is attached to one of the first filter's outputs in a distance corresponding to a multiple of the spin-precession length, the spin polarization is revealed as a conductance imbalance at the outputs. To achieve the required quasi one-dimensional transport modes we reduce either the effective width of the cascade's five wires by side-gate quantum-point contacts or we reduce the carrier concentration by means of a top gate. The latter yields the advantage to keep the width along the cascade's wires constant and thus, by ensuring higher homogeneity of the potential, reduces spurious effects in the measured conductances. The application of a magnetic field perpendicular to the cascade's plane results in a Lorentz force acting on the electrons in the cascade and thereby changing the measured conductance imbalance and the spin polarization. This can be used to quantify the strength of the spin-Hall effect in InAs heterostructures.

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