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Spin Dependent Transport in an InAs Two Dimensional Electron Gas[1] OLAF VAN 'T ERVE, GREG JONES, CONNIE LI, AUBREY HANBICKI, CHAFFRA AWO-AFFOUDA, MIKE HOLUB, BRIAN BENNETT, BEREND JONKER, Naval Research Laboratory — Semiconductors, such as InAs, that exhibit a large spin orbit interaction (SOI), provide a mechanism to manipulate the spins in the semiconductor by precession in a Rashba field caused by an electric field generated with a gate. However a large SOI also implies short spin lifetimes, due to spin-relaxation caused by the interaction of impurities and crystal structure with the electron's spin orbit. To make a practical device out of a material with a short spin lifetime, you would need a high mobility in order to get a spin diffusion length that is on the length scales of your device. We designed a high mobility InAs 2deg (45 000 cm^2/V-sec @ 5K) and used tunnel barrier contacts ($CoFe/Al_2O_3$ and $NiFe/Al_2O_3$) to electrically inject and detect electron spin in the 2deg. We will show spin dependent transport in the 2DEG both in the spin-charge region and in the pure spin diffusion region using 3 terminal and nonlocal devices respectively.

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Olaf van 't Erve
Naval Research Laboratory

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