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Measurement of Spin-dependent Conductivity in a GaAs/AlGaAs Two-dimensional Electron Gas[1] SEYED HADI EBRAHIMNEJAD RAHBARI, University of British Columbia, YUAN REN, UBC, SERGEY FROLOV[2], TUD, JOSHUA FOLK, UBC, WERNER WEGSCHEIDER, ETH — We describe a measurement of spin-dependent electrical conductivities of a partially polarized two-dimensional electron gas (2DEG), confined at the interface of GaAs/AlGaAs heterostructure and subject to an in-plane magnetic field. Our method uses polarized quantum point contacts to measure the nonequilibrium spin polarization that accompanies pure spin currents in a micron-wide channel of 2DEG. When the conductivities of spin-up and spin-down carriers are different, an unpolarized charge current that is injected into the center of the channel builds up a net spin accumulation near the injector, associated with an imbalance between the chemical potentials of the two spin populations. The chemical potential difference gives rise to a nonlocal voltage, which is then used to quantify the difference between spin-resolved conductivities.

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