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Coulomb drag and spin Hall Drag[1]

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Double-layer structures consisting of two parallel quantum wells separated by a potential barrier are an important class of nanoscale electronic devices. Each layer hosts a quasi-two dimensional electron gas and electrons interact across the barrier via the Coulomb interaction. When an electric current is driven in one of the layers the Coulomb interaction causes a charge accumulation in the other layer. This phenomenon, known as *Coulomb drag*, is of fundamental interest as a probe of electron correlations. Another effect of great interest is the *Spin Hall Effect*, i.e. the generation of spin accumulation by an electric current. This is due to spin-orbit interactions and has recently received great attention not only because of its theoretical subtlety but also for its usefulness as a source of spin-polarized currents. In this talk I describe a new effect, which arises from the combination of spin Hall effect and Coulomb drag. I call it *Spin Hall Drag*. The effect consists in the generation of transversal spin accumulation in one layer by an electric current in the other layer. Microscopic calculations indicate that the induced spin accumulation, although considerably smaller than the one observed in the ordinary spin Hall effect, is large enough to be detected in optical rotation experiments.

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