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Theory of coherent optical generation of ballistic spin currents

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Ballistic spin polarized currents, and ballistic pure spin currents, can be directly injected in semiconductors by a variety of all-optical processes. No bias voltage is required. Carrier and spin distributions far from equilibrium can thus be produced in both doped and undoped semiconductors, and their evolution and the resulting transport studied. We review the calculations we have made of these processes, and highlight some of the experimental results of our colleagues.