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**Imaging Drift and Diffusion of Accumulation from the Spin Hall Effect**[1] N.P. STERN, D.W. STEUERMAN, S. MACK, A.C. GOSSARD, D.D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, CA 93106 — The spontaneous generation of spin polarization near sample edges by the spin Hall effect when electron currents flow in a metal or semiconductor with spin-orbit coupling has attracted recent attention due to the elegant and complex spin-orbit physics as well as the potential for all-electrical spin generation in spintronics devices. Optical techniques in semiconductors allow for spatial resolution of the electrically generated spin accumulation, a feature not present in all-electrical measurements. We use Kerr rotation microscopy to image the spatial and temporal evolution of spin accumulation produced by the extrinsic spin Hall effect in n-GaAs devices. Measurements in a variety of device geometries, including arms transverse to a channel, reveal the unambiguous contribution of longitudinal spin drift in accumulation profiles[2]. We develop one- and two- dimensional drift-diffusion modeling to explain the observed features, providing a more complete understanding of observations of spin accumulation and the spin Hall effect.

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[2]N. P. Stern, D. W. Steuerman, S. Mack, A.C. Gossard, and D. D. Awschalom, *Appl. Phys. Rev. Lett.* **91**, 062109 (2007)

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