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Asymmetric spin absorption into a nonlocal spin detector SHUHAN CHEN, CHUAN QIN, YI JI, University of Delaware — Nonlocal spin detection measures a spin-dependent chemical potential difference associated with a spin accumulation in a nonmagnetic channel. Typically a ferromagnetic spin detector is in contact with the nonmagnetic channel. A spin-dependent voltage is developed between the detector and the channel when a fraction of the spin current in the channel is absorbed into the detector. We explore an unconventional approach for nonlocal spin detection by probing the voltage between the two ends of the ferromagnetic spin detector. The nonlocal spin valves with 150 nm wide Cu channels are fabricated by e-beam lithography. The ferromagnetic Py spin injectors are 250 nm wide and Py spin detectors are 120 nm wide. Low-resistance AlOx barriers are placed between the Py and the Cu. Since the spin absorption across the Cu/AlOx/Py detector interface is not spatially uniform, a net emf is formed near the junction and a net voltage develops between the two ends of the spin detector. This spin-dependent voltage is clearly detectable at room temperature and suggests an unconventional method of detecting nonlocal spin accumulation.

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