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**Field-induced negative differential spin lifetime in silicon** JING LI, University of Maryland, LAN QING, HANAN DERY, University of Rochester, IAN APPELBAUM, University of Maryland — Using experimental measurements of spin transport in undoped silicon, we show that the electric field-induced thermal asymmetry between the electron and lattice systems substantially impacts the identity of the dominant spin relaxation mechanism. In contrast to the Elliott-Yafet theory where intraband phonon absorption leads to spin relaxation, here we induce phonon *emission* during which electrons are scattered between conduction band valleys that reside on different crystal axes. This leads to anomalous behavior, where reduction of the transit time between spin-injector and spin-detector with larger electric field is accompanied by a counterintuitive reduction in spin polarization and an apparent *negative* spin lifetime.

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