Abstract Submitted
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Non-ohmic spin transport in n-type doped silicon[1] H.-JAE JANG, JING XU, JING LI, BIQIN HUANG, University of Delaware, Dept. of ECE, IAN APPELBAUM, University of Maryland, College Park, Dept. of Physics, UNIVERSITY OF DELAWARE, DEPT. OF ECE TEAM, UNIVERSITY OF MARYLAND, COLLEGE PARK, DEPT. OF PHYSICS TEAM — In contrast with undoped silicon transport layers [1], conduction-band bending in n-type doped silicon spintronic devices results in non-ohmic spin-polarized electron transport [2]: for low applied voltage drops across the transport layer, a potential well causes confinement of electrons in the silicon transport layer, and they must diffuse against an electric field to escape. Numerical simulation using a Monte Carlo algorithm reveals that the average transit time across our 3.3 um Si layer can be changed over 4 orders of magnitude by varying an applied voltage. We can therefore deduce a long spin lifetime [3] in n-type doped silicon from comparison between experimental data and fitting-parameter-free simulation results in spite of the short transport distance. References [1] Ian Appelbaum et al. Nature 447, 295 (2007). [2] H.-Jae. Jang et al. Phys. Rev. B 78, 165329 (2008). [3] Biqin Huang et al. Phys. Rev. Lett. 99, 177209 (2007).

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