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Spin Dynamics in Bi2Se3 / GaAs Heterostructures ANDREW L. YEATS, PAUL V. KLIMOV, BOB B. BUCKLEY, Center for Spintronics and Quantum Computation, University of California, Santa Barbara CA 93106, ANTHONY RICHARDELLA, DUMING M. ZHANG, NITIN SAMARTH, Center for Nanoscale Science & Dept. of Physics, Penn State University, University Park PA 16802, MICHAEL E. FLATTE, Dept. of Physics, University of Iowa, Iowa City IA 52242, DAVID D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara CA 93106 — The narrow band gap semiconductor Bi_2Se_3 has been characterized as a topological insulator (TI), wherein strong spin-orbit coupling and time-reversal symmetry give rise to spin-polarized surface conduction states. Molecular beam epitaxy (MBE) of Bi_2Se_3 thin films onto conventional semiconductors such as GaAs [1] provides an attractive pathway for the creation of hybrid devices, coupling the exotic spin physics of TIs with the well-understood properties of spin coherence in semiconductors. We employ spatio-temporally resolved optoelectronic techniques to probe the carrier spin dynamics at the heterointerface between a TI and GaAs. Results are compared with interface band structure calculations.

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[1] A. Richardella, D. M. Zhang, J. S. Lee, A. Koser, D. W. Rench, A. L. Yeats, B. B. Buckley, D. D. Awschalom and N. Samarth, *Appl. Phys. Lett.* **97**, 262104 (2010).

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