Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sorting Category: 17.1.3 (E)

Spin relaxation times and spin-dependent transport of silicon 2DEG and donors in high magnetic fields[1] CHEUK CHI LO, C.D. WEIS, J. BOKOR, T. SCHENKEL, Lawrence Berkeley National Laboratory, V. LANG, R.E. GEORGE, J.J.L. MORTON, University of Oxford, A.M. TYRYSHKIN, S.A. LYON, Princeton University, J. VAN TOL, National High Magnetic Field Laboratory — We measured the spin-lattice relaxation (T_1) and spin coherence (T_2) times of the two-dimensional electron gas (2DEG) and neutral donors in a silicon field-effect transistor by pulsed electrically detected magnetic resonance at ≈ 3.4 T. The 2DEG T_1 varies between $\approx 200 - 800$ ns depending on the carrier density with an in-plane magnetic field configuration, but remains constant at ≈ 400 ns with an out-of-plane field configuration. On the other hand, $T_2 \approx 50 - 150$ ns for all carrier densities and both field orientations. The neutral donor T_1 and T_2 are found to be similar to that of the 2DEG. At even higher out-of-plane magnetic fields of $8 - 12$ T, Landau levels are clearly resolved in transport measurements and both the 2DEG and donor EDMR signals show corresponding oscillatory behavior as the carrier density is varied. We attribute this behavior to the alignment of the Fermi level with spin-split and different indexed Landau levels.

[1]This work was supported by NSA (100000080295) and DOE (DE-AC02-05CH11231).

[X] Prefer Oral Session
[ ] Prefer Poster Session

C. C. Lo
cclo2@lbl.gov
Lawrence Berkeley National Laboratory

Date submitted: 16 Dec 2011 Electronic form version 1.4