Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Electrically Detected Hahn Echoes in Si:P[1] HANS HUEBL, BENNO GROLIK, ANDRE R. STEGNER, MARTIN STUTZMANN, MARTIN S. BRANDT, Walter Schottky Institut, Garching, Germany — Several proposals discuss the realization of quantum computation with the help of the spin degree of freedom in semiconductors, including implementations using the nuclear or electronic spin of phosphorus donors. Recently, Stegner et al. [1] showed in ensemble measurements that the electron spin state of donors can be read out electrically by investigating the current transient after the application of a microwave pulse and by observing Rabi oscillations. In this contribution we show that this technique can be extended to detect Hahn echoes which allow to determine the T_2^* time of the specific spin-to-charge transfer system used. We observe $T_2^* \approx 1.2\mu$s at 6 K under illumination with a tungsten lamp. This time is considerably shorter than T_2 characteristic of isolated P in Si, most likely due to the interaction with the Si-SiO_2 interface and photoexcited carriers. The experiments show that dynamic constants specific to the actual spin read-out technique used can be determined by pulsed electrically detected magnetic resonance. [1] A. R. Stegner et al., Nature Physics doi:10.1038/nphys465

[1]Funding DFG (SFB 631)

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Date submitted: 20 Nov 2006 Electronic form version 1.4