Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Spin Relaxation due to Dyakonov-Perel's Mechanism in N-type Quantum Wells under an Externally Applied Stress SHU-WEI CHANG, SHUN-LIEN CHUANG, University of Illinois at Urbana-Champaign — We derived and calculated the spin relaxation time in n-type quantum wells grown along an arbitrary orientation. Unlike the early theory [1] for quantum wells, we include spin relaxation due to polar longitudinal-phonon and impurity scattering mechanisms by treating the corresponding Fourier components of the interaction matrix elements and the occupation number in the phase space exactly. Without using an extracted momentum relaxation time from the experimental data as an input parameter [2], our direct theoretical result of the spin relaxation time as a function of temperature agrees well with the experimental data for quantum wells grown along the [100] direction [3]. We further derived the strain-dependent effective magnetic field for the DP interaction Hamiltonian in the momentum space for quantum wells grown along an arbitrary direction. The influences of the magnitude and direction of the external stress on spin relaxation in n-type quantum wells will also be discussed. [1] M. I. D'yakonov and V. Yu. Kachorovskii, Sov. Phys. Semicond. 20, 110-112 (1986). [2] W. H. Lau, J. T. Olesberg, and M. E. Flatte, Phys. Rev. B 64, 161301(R) (2001). [3] T. Adachi, Y. Ohno, F. Matsukura, and H. Ohno, Physica E 10, 36-39 (2001).

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Date submitted: 21 Dec 2004 Electronic form version 1.4