Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Spin-polarized electron states in a quantum film based on narrow - band semiconductors[1] LEONID ISAEV, YONG JOE, ARKADY SATANIN, Ball State University, Muncie, IN, SERGIO ULLOA, Ohio University, Athens, OH — Narrow–gap semiconductors (NGS) with strong spin-orbit interactions are promising materials as a source of polarized electrons. Electron states in NGS are described by the Dirac-type equation with Hamiltonian parameters determined by the Kane interband matrix element [1]. Modern epitaxial technology makes it possible to create quantum films (QF) (or quantum wells) with a *given* spatial dependence of the composition, *i.e.* control of the position-dependence of the energy gap. The electron dispersion in a homogeneous QF with same boundaries still keeps the spin degeneracy [2]. In the present work it is shown that the position dependent gap leads to spin-splitting of the electron dispersion in a QF. For a film with a *linear* spatial gap variation in the transverse direction, the solution of the Dirac equation can be found exactly. Near the gap the proposed spin-orbit mechanism approximately reduces to Rashba's term with the loop in dispersion. The electron polarization degree for a QF based on a $Pb_{1-x}\ Sn_x\ Te$ system is calculated. [1] J. O. Dimmock *et al*, Phys. Rev. **16**, 1193 (1966). [2] S.Yu. Potapenko and A. M. Satanin, Sov. Phys. Solid State **26**, 1067 (1984).

[1]Supported by The Indiana 21st Century Research and Technology Fund.

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Date submitted: 05 Dec 2004 Electronic form version 1.4