Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Spin-orbit coupling in InAs-based wurtzite quantum wells[1] J.Y. FU, POLIANA H. PENTEADO, J. CARLOS EGUES, University of Sao Paulo — By folding down the 8×8 Kane model, accounting for the s-p_z orbital mixing, we derive an effective Hamiltonian for the conduction electrons. In this derivation, we consider the renormalization of the spinor component of the conduction band wave function. In addition to the Rashba-type term arising from the bulk inversion asymmetry of the wurtzite lattice, we obtain the usual linear in momentum Rashba term induced by the structural inversion asymmetry of the well. We also find a new Rashba-like contribution, proportional to the well profile only and not to its derivative. We self-consistently calculate the spin-orbit coupling parameters for single and double wurtzite InAs-based wells with two subbands. By gating the structures, we find that the new Rashba term shows a distinctive voltage dependence as compared to that of the usual Rashba coupling. Finally, for the double-well case, we find that both the intersubband spin-orbit coupling and the Dresselhaus term for each subband show a resonant behavior for the symmetric configuration of the well.

[1]This work was supported by FAPESP and CNPq. One of the authors (J.Y.F) thanks Gerson J. Ferreira, Marco O. Hachiya and E. Bernardes for valuable discussions.

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Date submitted: 27 Dec 2010 Electronic form version 1.4