Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

A study of interminiband Rabi oscillations in biased semiconductor superlattices[1] PAVEL ABUMOV, DONALD SPRUNG, Dept. of Physics and Astronomy, McMaster University, Hamilton ON L8S 4M1, Canada — Semiconductor superlattices can be a flexible source of coherent electrons, with possible application as sources of terahertz radiation and in quantum computing. A better understanding of the underlying quantum transport phenomena is essential for making further progress in these fields. We have studied interminiband Rabi oscillations of an electron in biased semiconductor superlattices, specifically the conditions for their occurrence and their variation with bias tuning at energy level anticrossings. Our simulations were based on direct solution of the time-dependent Schroedinger equation, using transparent boundary conditions. It has been explicitly demonstrated that interminiband Rabi oscillations result from constructive interference between Bloch and intrawell oscillations, and the conditions for resonant bias values have been investigated. We also report a simulation of interminiband Rabi oscillations directly across three minibands at high bias, which show interaction between three strongly coupled minibands.

[1]Work supported under NSERC discovery grant RGPIN-3198.

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Date submitted: 14 Nov 2006 Electronic form version 1.4