Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Rabi oscillations in semiconductor multiwave response MIKHAIL EREMENTCHOUK, MICHAEL LEUENBERGER, University of Central Florida — We study the semiconductor response with respect to high intensity resonant excitation on short time scale when the contribution of the Fermi statistics of the electrons and holes prevails. Both the single and double pulse excitations are considered in the framework of asymptotically exact description. For the double pulse excitation we consider the time evolution of the multiwave mixing (MWM) exciton polarization. The main difference between the excitation by a single pulse or by two non-collinear pulses is that the Rabi oscillations of the MWM response are characterized by two harmonics. The operator dynamics governed by the external excitation exhibits three invariant spin classes, which do not mix with the evolution of the system. Two classes correspond to the bright exciton states and one contains all dark states. The dynamics of the classes turn is described by six characteristic frequencies and the Rabi frequencies (RF) are only two of them (one for each bright class). We show that if initially the system is in the ground state then the semiconductor Bloch equation preserves the invariant spin classes thus proving absence of the dark excitons in the framework of this description. We found that due to the mass difference between holes of different kind two additional RF's, presenting in the operator dynamics, should appear in the evolution of the exciton polarization.

Mikhail Erementchouk
University of Central Florida

Date submitted: 20 Nov 2008 Electronic form version 1.4