

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**A Model Study of Photomagnetization in Diluted Magnetic Semiconductors** S.N. BEHERA, IIT/Bhubaneswar, S.M. BOSE, Drexel University, J.T. SCHICK, Villanova University — In the context of application to spintronics, photon induced magnetization or photomagnetization (PM) of diluted magnetic semiconductors (DMS) like  $\text{Hg}_{1-x}\text{Mn}_x\text{Te}$  [1] has been the subject of many recent investigations. We present results of a model calculation of the dependence of the PM on the photon power in a DMS for different temperatures and different magnetic impurity concentrations. The model which includes kinetic energies of the charge carriers created by the incident light, the attractive Coulomb interaction between the electrons and the holes treated in the mean field approximation, the coupling of the photon with the exciton density, and the magnetic interaction between the spins of the charge carriers and the magnetic moments of the magnetic impurity atoms in the semiconductor is solved exactly using the equation of motion of the Green's functions method. Expressions for the densities of spin up and spin down charge carriers, and their magnetization and that of the magnetic impurities obtained in the form of a set of coupled equations are solved self consistently to determine the PM. Interestingly there is a temperature dependent threshold in photon power for the appearance of the PM. A detailed study of the dependence of the PM on different parameters will be presented.

[1] H. Krenn et al., PRL **55**, 1510 (1985).

Shyamalendu Bose  
Drexel University

Date submitted: 23 Nov 2010

Electronic form version 1.4