Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Infrared magnetic linear dichroism spectroscopy of (Ga,Mn)As
N. TESAROVA, J. SUBRT, P. MALY, P. NEMEC, Faculty of Mathematics and Physics, Charles University in Prague, K. VYBORNY, Institute of Physics, Academy of Sciences of the Czech Republic, C.T. ELLIS, ALOK MUKHERJEE, J. CERNE, Department of Physics, University at Buffalo, SUNY — The sensitivity of magnetic linear dichroism (MLD) to in-plane magnetization makes it well suited to study diluted magnetic semiconductors such as (Ga,Mn)As, where MLD can be used to probe electronic excitations in the material. The band structure supporting these excitations yields rich in-plane magnetization effects, which include anisotropic magnetoresistance and four non-perpendicular, in-plane easy axis orientations. Observation of these effects provides insights into the electronic structure of (Ga,Mn)As. In this work we introduce a new, low-temperature, infrared MLD measurement technique that reduces instrumentation artifacts and enables broadband (0.1 eV $<E_{ph}<$2.7 eV) capabilities. Through these MLD measurements we sensitively and systematically probe electronic structure in (Ga,Mn)As samples with Mn concentrations varying from 3%-14%. In general, the data show an MLD enhancement in the visible and infrared regimes, which are indicative of interband transitions between the valence and conduction bands and optical transitions within the valence band, respectively. We find that the behavior of these MLD features with increasing Mn concentration is in reasonable agreement with theoretical predictions. We acknowledge financial support provided by NSF-DMR1006078 and the Faculty of Mathematics and Physics, Charles University in Prague.

Chase Ellis
Department of Physics, University at Buffalo, SUNY

Date submitted: 09 Nov 2012 Electronic form version 1.4