Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Room-Temperature Femtosecond Faraday Effect in CdMnTe Single Crystals D. WANG, R. SOBOLEWSKI, University of Rochester, Rochester, NY 14627, M. MIKULICS, Technical University Carolo-Wilhelmina, D-38106 Braunschweig, and Research Center Juelich, D-52425 Juelich, Germany, A. MYCIELSKI, Polish Academy of Sciences, PL-02668 Warszawa, Poland — We report the subpicosecond Faraday effect, measured in high quality $Cd_{1-x}Mn_xTe$ (x = 0.12 and x = 0.09) single crystals at room temperature. Using a femtosecond pump-probe technique, we were able to generate sub-picosecond current pulses by illuminating a free-standing LT-GaAs photoswitch, couple those pulses to the CdMnTe probe crystal using a coplanar transmission line, and, finally, optically sample the temporal evolution of the resulting magnetic transients with subpicosecond resolution and the excellent signal-to-noise ratio. The ultrafast (below 600 fs) Faraday rotation, responsible for the observed magneto-optical effect, has been attributed to the ultrafast spin dynamics of holes in our p-type CdMnTe crystals. The observed femtosecond Faraday effect can be the basis for a development of a magneto-optical sampling system for ultrafast, time-resolved characterization of current transients in novel electronic and spintronic devices.

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Date submitted: 22 Dec 2005 Electronic form version 1.4