Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Influence of antiferromagnetic interactions on ferromagnetic properties of p-(Cd,Mn)Te quantum wells T. DIETL, A. LIPIŃSKA, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland, C. SIMSERIDES, K. N. TROHIDOU, Institute of Materials Science, NCSR Demokritos, Athens, Greece, A. MAJHOFER, Institute of Experimental Physics, University of Warsaw, Poland — Modulation-doped p-type (Cd,Mn)Te/(Cd,Mg,Zn)Te quantum wells (QWs) remain a unique medium allowing to probe carrier-induced Ising-like ferromagnetism in the two-dimensional case, as in this system the mean free path is longer than the QW width [1]. However, a surprising result is the absence of hysteresis loops below the Curie temperature. In order to obtain information on mechanisms controlling spin dynamics, we have extended our previous Monte Carlo (MC) simulations combining Metropolis algorithm with the determination of hole eigenfunctions at each MC sweeps [2], and found that short range spin-spin antiferromagnetic (AFM) interactions play a crucial role in the accelerating magnetization dynamics. Moreover, we reveal that the effect of AFM interactions becomes much reduced if the thickness of the layer containing Mn spins is narrower than the extend of the hole wave function. This implies that magnetic hysteresis should be recovered in quantum wells, in which the thickness of the Mn layer would be smaller than the region visited by the holes. [1] H. Boukari et al., Phys. Rev. Lett. 88, 207204 (2002); [2] D. Kechrakos et al., ibid 94, 127201 (2005).

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Date submitted: 19 Nov 2008 Electronic form version 1.4