Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Non-equilibrium Magnetic Ordering in Quantum Dots JAMES PIENTKA, RAFAL OSZWALDOWSKI, IGOR ZUTIC, JONG HAN, University at Buffalo, ANDRE PETUKHOV, South Dakota School of Mines and Technology — We study semiconductor Quantum Dots (QDs) with magnetic impurities. The magnetism in these systems can be controlled in ways not possible in bulk semiconductors [1]. Robust magnetic effects have been observed recently in both colloidal and self-assembled QDs [2,3]. Here, we develop a rate-equations approach to describe the carrier-mediated magnetic ordering in QDs. In this situation, the magnetic properties are different from the steady-state scenario, due to different carrier spin density, which affects the magnetic-impurity alignment. We focus on a type-II QD band profile, where the electrons reside in the barrier, while the holes are localized in the QD interior, which contains the magnetic impurities. Supported by DOE-BES, US ONR, AFOSR, NSF-DMR and NSF-ECCS CAREER.

[1] R. M. Abolfath, A. G. Petukhov, and I. Zutic, Phys. Rev. Lett. **101**, 207202 (2008); I. Zutic and A. G. Petukhov, Nature Mater.**4**, 623 (2009).
[2] R. Beaulac et al., Science **325**, 973 (2009).
[3] I. R. Sellers, R. Oszwaldowski, et al., Phys. Rev. B **82**, 195320 (2010).

Rafal Oszwaldowski
University at Buffalo

Date submitted: 20 Dec 2010 Electronic form version 1.4