Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Spin Fluctuations in Magnetic Quantum Dots[1] A.G. PETUKHOV, South Dakota School of Mines, R.M. ABOLFATH, University of Texas, IGOR ZUTIC, SUNY Buffalo — We present a theoretical description of magnetism in quantum dots (QDs) doped with magnetic ions. It has been recognized that the mean-field theory (MFT) is inadequate for small magnetic systems, such as bound magnetic polarons (BMPs), at finite temperatures [1]. Magnetic QDs are in many respects similar to BMPs, however the latter are one-electron systems while the former may contain many electrons. Our approach requires the minimization of the generalized "free energy" functional [2] for QDs, which leads to a set of self-consistent Kohn-Sham-type equations that coincide with MFT-equations [3] in the thermodynamic limit. We reveal that the well-known spurious MFT second order phase transition in magnetization is completely removed by thermodynamic spin fluctuations.

[1] T. Dietl and J. Spalek, Phys. Rev. Lett. **48**, 355 (1982).
[2] A. G. Petukhov, I. Zutic, and S. C. Erwin, Phys. Rev Lett. **99**, 257202 (2007)
[3] R. M. Abolfath, A. G. Petukhov, and I. Zutic, Phys. Rev. Lett. **101**, 207202 (2008); R. M. Abolfath, P. Hawrylak, and I. Zutic, Phys. Rev. Lett. **98**, 207203 (2007).

[1]Supprted by US ONR, NSF-ECCS.

A.G. Petukhov
South Dakota School of Mines

Date submitted: 08 Dec 2008 Electronic form version 1.4