Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Electronic states in magnetic quantum dots and quantum-dot molecules: Coulomb interaction effects and spontaneous symmetry breaking ALEXANDER GOVOROV, Ohio University , WEI ZHANG, Ohio University & Institute of Applied Physics and Computational Mathematics, Beijing, China — We investigate theoretically few-electron states in semi-magnetic quantum dots and quantum-dot molecules [1,2]. A double quantum-dot system made of diluted magnetic semiconductor behaves unlike the usual molecules. In a semiconductor double quantum dot or in a diatomic molecule, the ground state of a single carrier is described by a symmetric orbital. In a magnetic material molecule, new ground states with broken symmetry can appear due the competition between the tunneling and magnetic polaron energy. With decreasing temperature, the ground state changes from the normal symmetric state to a state with spontaneously broken symmetry. Interestingly, the symmetry of a magnetic molecule is recovered at very low temperatures. A magnetic double quantum dot with broken-symmetry phases can be used as a voltage-controlled nanoscale memory cell. [1] A. O. Govorov, Phys. Rev. B 72, 075359 (2005). [2] W. Zhang, T. Dong, and A. O. Govorov, Phys. Rev. B 76, 075319 (2007).

Alexander Govorov
Ohio University

Date submitted: 15 Dec 2007 Electronic form version 1.4