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Reentrant Magnetic Polaron Formation in Quantum Dots[1] JAMES PIENTKA, RAFAL OSZWALDOWSKI, JONG HAN, IGOR ZUTIC, SUNY at Buffalo, ANDRE PETUKHOV, South Dakota School of Mines and Technology — Recently, there have been several theoretical studies that show multiple ways of manipulating magnetic ordering in Quantum Dots (QD) [1,2]. Experiments [3,4] display the formation of Magnetic Polarons in both colloidal and self-assembled QDs. 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. In our model, photo-excitation of carriers induces a quasi equilibrium. We consider various QD states to describe the carrier-mediated magnetic ordering in QDs. Allowing for different QD states changes the magnetic properties due to different carrier spin density [5], which affects the alignment of the magnetic impurities. [1] R. M. Abolfath, A. G. Petukhov, and I. Zutic, Phys. Rev. Lett. 101, 207202 (2008); [2] I. Zutic and A. G. Petukhov, Nature Mater.4, 623 (2009). [3] R. Beaulac et al., Science 325, 973 (2009). [4] I. R. Sellers, R. Oszwaldowski, et al., Phys. Rev. B 82, 195320 (2010). [5] J. M. Pientka, R. Oszwaldowski, A. G. Petukhov, J. E. Han, and I. Zutic, Reentrant Magnetic Polaron Formation in Quantum Dots, preprint.

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