Abstract Submitted
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Optical control and determination of charge in self-assembled quantum dots M. KORKUSINSKI, P. HAWRYLAK, IMS NRC, Ottawa, Canada, A. BABINSKI, Warsaw University, Poland, M. POTEMSKI, GHMFL, CNRS Grenoble, France, S. RAYMOND, J. LAPOINTE, Z. WASILEWSKI, IMS NRC, Ottawa, Canada — We present a theory and experiment allowing for optical control of charge in a single InAs/GaAs quantum dot (QD) in magnetic fields up to 23 T [1]. The charge is controlled by excitation energy and power and is determined by comparing the experimental PL spectra of the QD to the ones calculated for N electrons and one hole using the parabolic confinement and the CI technique for many-carrier states. The number N is determined from the characteristic features in PL [2]. For N=4 electrons in low fields the degenerate p shell is half-filled and the system is in a triplet state. At larger fields the degeneracy is removed and a triplet-singlet transition occurs. This transition is seen as a discontinuity in the magnetic-field dependence of PL lines. In even higher fields, electrons increase their polarization through spin-flip transitions, which also leads to discontinuities of the PL spectra. Also, as the magnetic moment of electrons increases, the electron-hole exchange leads to the appearance of multiple PL lines. [1] A. Babinski et al, Physica E 26, 190 (2005) [2] A. Wojs and P. Hawrylak, Phys. Rev. B 55, 13066 (1997)

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