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Single exciton spectroscopy in a single semimagnetic quantum dot J. FERNANDEZ-ROSSIER, Departamento de Física Aplicada. Universidad de Alicante — Motivated by recent experiments of single spin detection [1,2] and optically induced magnetization [3], the problem of a photoexcited (II,Mn)VI Diluted Magnetic Semiconductor quantum dot is studied. The Hamiltonian of N spins exchange-coupled to an electron hole pair is solved both exactly (for Nσ 7) and in mean field approximation, using numerical diagonalization. The Hamiltonian involves as well the electron-hole pair exchange, the spin orbit interaction of the holes and the Mn-Mn antiferromagnetic exchange. The ground state and spin wave excitation are obtained both with and without the exciton present in the dot. Using linear response theory in the light-matter coupling, the absorption and emission spectrum are calculated and compared with those of the experiments. The optical signatures of the exciton induced spin order are discussed. Prospects for the optical detection of the number of Mn spins in a single are commented. [1] G. Bacher et al. Phys. Rev. Lett. **89**, 127201 (2002) [2] L. Besombes, et al. Phys. Rev. Lett. **93**, 207403 (2004) [3] S. Mackowski et al., Appl. Phys. Lett. **84**, 3337 (2004)

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