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Exciton-Mn ion interaction in CdTe quantum dots¹ ANNA TROJNAR, MAREK KORKUSINSKI, EUGENE KADANTSEV, PAWEL HAWRYLAK, Institute for Microstructural Sciences, NRC, Ottawa, Canada, K1A0R6 — We develop a microscopic theory of optical properties of quantum dots containing a single magnetic ion [1,2] which includes electron-hole correlations, short range exchange of Mn ion with electron and with heavy hole, long range electron-hole exchange, quantum dot anisotropy and external strong magnetic field. A new quantum interference (QInt) effect between electron-hole Coulomb scattering and scattering by Mn ion is obtained. Special role is played here by configurations with electron and hole on the p-shell and degenerate with it configurations with electron (hole) on s-shell and hole(electron) on a d-shell. QInt is shown to significantly reduce exciton-Mn coupling. The signature of this QInt effect in emission and absorption spectrum is discussed. The effect of strong magnetic field on the characteristic emission spectrum is discussed and the limitations of the spin model are established.

[1] S.-J.Cheng et al, Eur. Phys. Lett. 81, 37005 (2008)

[2] L.Besombes, Phys. Rev. Lett. 93, 207403 (2004).

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