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Many-body effects in the cyclotron resonance of few-electron quantum dots doped with a single magnetic impurity NGA T.T. NGUYEN, F.M. PEETERS, Departement Fysica, Universiteit Antwerpen, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium — The magneto-optical absorption spectrum of a II-VI cadmium telluride based quantum dot containing few electrons ($N_e = 1 \div 5$) doped with a single magnetic impurity (Mn^{2+}) is studied in the presence of a magnetic field. The strongly correlated electrons interact with the magnetic ion (Mn-ion) through the spin-spin exchange interaction which 1) competes with the Zeeman splitting energies leading to the existence of different magnetic phases, 2) results in the coupling of the electron center-of-mass motion with the relative motions leading to significant changes in the cyclotron resonance spectrum as compared to the case without a Mn-ion. At the ferromagnetic-antiferromagnetic transition: 1) the ground-state energy exhibits a cusp, 2) the cyclotron resonance energies exhibit a shift, 3) the oscillator strengths are discontinuous, and 4) the number of allowed transitions increases. The cyclotron resonance spectra are obtained which are quantitative and qualitative different for different N_e due to the breakdown of Kohn's theorem. The results are dependent on the position of the Mn-ion inside the quantum dot.

Nga T. T. Nguyen and F. M. Peeters, Phys. Rev. B **78**, 045321 (2008); **78**, 245311 (2008); **80**, 115335 (2009).

Nga T. T. Nguyen
Departement Fysica, Universiteit Antwerpen,
Groenenborgerlaan 171, B-2020 Antwerpen

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