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HIGH MAGNETIC FIELD OPTICAL STUDIES OF CHARGED EXCITON IN CdTe 2D ELECTRON GASES

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Photoluminescence (PL) and reflectivity spectroscopy in magnetic fields up to 60 Tesla are used to investigate the excitonic optical transitions within CdTe/(Cd,Mg)Te 2D electron gases. The samples are 100 A and 200 A wide quantum well (QW) wherein the electron density is varied smoothly from $1x10^{11}$ to $4.5x10^{11}$ cm^{-3} across the wafer. This allows us to follow the energy diagram of the neutral exciton (X_0) and the charged exciton singlet and triplet spin states (X^-_s, X^-_t) versus magnetic field and the electron density. We observe a weak PL peak above 12 T (15 T) for the 200 A QW (100 A) at the low energy side of the spectra in addition to the X^-_0 and X^-_S PL. This peak could be the signature of a fundamental dark triplet state recently predicted (*Phys. Rev. B* **62**, 4630). Moreover, for high density samples a balance of PL intensity between the X^-_S and an other X^-_t occurs in the 25T-30T range. These results are interpreted on the basis of the calculations by Wojs *et al.* (*Phys. Rev. B* **62**, 4630) taking account the Zeeman energy of the charged exciton.