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Magnetic Circular Dichroism (MCD) studies on GaMnAs M. DOBROWOLSKA, K. TIVAKORNSASITHORN, X. LIU, J.K. FURDYNA, Univ. of Notre Dame, M. BERCIU, Univ. of British Columbia — Although there is general consensus that the ferromagnetic coupling between Mn spins in GaMnAs is mediated by itinerant holes, the nature of the hole wavefunctions is still under debate. We studied MCD on a series of $Ga_{1-x}Mn_xAs$ layers grown by MBE, with x ranging from 0.02 to 0.06 to address this issue. We compare the MCD spectra taken on those samples with spectra taken on $Ga_{0.98}Mn_{0.02}As$ samples co-doped with Be. We observe that the MCD signal disappears in the vicinity of the energy gap for samples with Be concentration higher than 1×10^{20} cm^{-3} while in the undoped samples (even for x = 0.06) MCD rises sharply at the band gap. As was shown by Berciu et al [1], the MCD signal in GaMnAs arises primarily from a difference in the density of spin-up and spin-down states in the valence band. In the case of Be-doped samples the Fermi level lies in the valence band and consequently interband transitions at the band gap disappear. By contrast, strong MCD signal observed at the band gap in the undoped samples indicates a difference in the density of spin-up and spin-down states at the top of the band, indicating that the Fermi level must lie in the IB.
[1] M. Berciu et al., Phys. Rev. Lett. 102, 247202 (2009).

Margaret Dobrowolska
University of Notre Dame

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