Zeeman splitting of donor- and acceptor-bound excitons in homoepitaxial GaN

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The donor-(D^0,X) and acceptor-(A^0,X) bound excitons observed in photoluminescence (PL) measurements on homoepitaxial GaN layers grown by MOVPE on a pre-treated GaN single crystal show extremely narrow line width of ≈ 100 μeV [1]. We study with high resolution the Zeeman splitting of these lines in magnetic fields of up to 6 T in Faraday and in Voigt configuration. For either of the two bound exciton systems we resolve a manifold of allowed and forbidden transitions with different polarisation properties. These splitting patterns are more complete than those reported in literature hitherto and allow us to derive the angular dependent g-factors of the holes and electrons bound in the radiative excitonic complex.

For the (D^0,X), the two-electron-satellite (TES) transitions are resolved also and analysed in detail. The splitting of the (D^0,X) main line is replicated in these transitions, accompanied by an extra, larger splitting due to the $2p_{(0,\pm)}$ final state, into which the donor electron is excited.

[1] K. Kornitzer, T. Ebner, K. Thonke, R. Sauer, C. Kirchner, V. Schwegler, M. Kamp, M. Leszczynski, I. Grzegory, S. Porowski , Phys. Rev. B60, 1471 (1999)

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