HL 4: Invited Talk Goldhahn

Time: Monday 14:00–14:45 Location: ER 270

Invited Talk HL 4.1 Mon 14:00 ER 270

Optical spectroscopy of wide-gap semiconductors: Is our picture of van Hove singularities still valid? — •Rüdiger Goldhahn — TU Ilmenau, Institut f. Physik, PF 100565, 98684 Ilmenau

The current understanding of the spectral dependence of the dielectric function (DF) for the nitride semiconductors InN, GaN, and AlN is rather scanty. The shape of the DF closely related to the band structure of the materials, i.e. it shows peculiarities in the vicinity of the critical points (CP), the so-called van Hove singularities. Ellipsometry was applied in order to determine both the ordinary and extraordinary dielectric tensor components for all binary compounds up to 10 eV. The experimental results are compared to the results of theoretical calculations. Density functional theory in the local density approximation leads to independent-particle DFs which emphasize the observed optical anisotropy, but the peaks are found at higher energies with respect to the experimental data. If instead the electron-hole Hamiltonian (exciton effects) is employed for the calculations the overall agreement is strongly improved, i.e. the comparison of both calculated DFs yields the size of the peak shift for the high-energy CPs caused by the final state interaction. In the second part of the talk, the influence of electric fields on the electron-hole correlated DF will be discussed in detail.