POZVÁNKA

na seminář oddělení 15 Fyzikálního ústavu AV ČR, v.v.i.

Seminář se koná

v pátek 1. prosince 2017 ve 14:00

v zasedací místnosti budovy A (vedle knihovny) Fyzikálního ústavu, Cukrovarnická 10, Praha 6.

Na programu je přednáška

Magnetic properties of InP wurtzite nanowires: theoretical investigation of g-factors and exciton Zeeman splittings

kterou prosloví

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Abstrakt

Spin-dependent phenomena in III-V wurtzite semiconductor nanowires have recently attracted great attention. Unlike their zinc-blende counterparts, some basic properties of these novel non-nitride wurtzite materials are still unknown or not fully understood. For instance, recent experiments showed that InP nanowires exhibit an unconventional and unexplained nonlinear Zeeman splitting under high magnetic fields. Starting with a robust 8×8 $\vec{k}\cdot\vec{p}$ Hamiltonian, we investigate the magnetic properties of InP in the wurtzite phase, specifically focusing on g-factors and exciton Zeeman splitting. At low magnetic fields, the Zeeman splitting is linear and our calculated values of effective g-factors are in excellent agreement with experimental data. Furthermore, our calculations allow us to distinguish the independent contributions of electron and hole g-factors, typically entangled in experiments due to excitonic effects. We also investigated the physics of Landau levels (with spin and orbital effects) by including the spatial dependence of the vector potential to understand the nonlinear Zeeman splitting of excitons in large magnetic fields. We showed that the origin for nonlinear features of the exciton Zeeman splitting found in experiments arise due to the interaction between heavy and light hole bands with spin up from different Landau level indices. Moreover, we performed robust numerical calculations to include excitonic effects and found that our results also provide a great agreement to the experimental data.
