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Donor impurities in elliptic quantum disks: magnetic-field effects
ZDENKA BARTICEVIC, MONICA PACHECO, PABLO ULLOA, Universidad Santa Maria, Chile — We present a theoretical study of the optical energy spectrum of donor impurities in elliptic semiconductor quantum disks in the presence of magnetic fields. We work in the framework of the effective mass theory adopting a model of parabolic bands, valid for donor impurities in the majority of the semiconductors III-V. We calculate the energy spectrum and binding energies of donor impurities by assuming high geometrical confinement along the quantum disk growth direction, and a lateral confinement modeled by a parabolic potential of elliptic geometry. We study the effects of the loss of the cylindrical symmetry of the lateral potential on the energy spectrum and binding energies of impurities located in different positions in the quantum disk. We found that the presence of a uniform magnetic field perpendicular to the quantum disk induces remarkable changes in the energy spectrum of the confined impurity. By changing the magnitude of the field it is possible to obtain and to modify, in a wide range of energies, different impurity optical transitions in the quantum disk.

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