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Magneto-optics of single Rashba spintronic quantum dots subjected to a perpendicular magnetic field MANVIR KUSHWAHA, University of Puebla, Puebla, Mexico — We report on the theoretical investigation of the effect of the Rashba-type spin-orbit interaction (SOI) on the Fock-Darwin energy spectrum in the parabolically confined quantum dots in the presence of a perpendicular [to the original two-dimensional electron gas (2DEG)] magnetic field. The study is based on the exact analytical results obtained without any approximation and numerical simulation. We observe that the SOI modifies drastically the optical, thermodynamic, as well as magneto-optical properties of the (narrow-gap InAs) quantum dots. We discuss the dependence of the Fock-Darwin spectrum, Fermi energy, optical transitions, and magnetization on all the important parameters involved in the theory such as, for example, the orbital quantum number, the magnetic field, the confinement potential, and the Rashba parameter that characterizes the strength of the SOI. The illustrative examples include the results both with and without the SOI, for the sake of comparison. One of the most important observation is that the Rashba SOI causes the band mixing and band shifting in the quantum dots and the Fock-Darwin energy spectrum becomes richer but complex. This complexity seems to arise due to an intricate interplay between the SOI and the Zeeman energy.

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