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Quantum shape effect on Zeeman splittings in semiconductor nanostructures POCHUNG CHEN, National Tsing Hua University — Controllability of spins in semiconductor nanostructures has become one of the important subject to be investigated in recent years due to the novel field of spintronics and quantum information processing. Manipulation of the spin depends crucially on fundamental spin properties such as the effective Lande g-factors or equivalently the Zeeman splitting. It is thus imperative to develop a feasible and accurate method to calculate magneto-optical properties of nanostructures. In this work we develop a general method to calculate Zeeman splittings of electrons and holes in nanostructures within the tight-binding framework. The isotropicity and the nonlinearity of Zeeman splitting can be reliably extracted. The method explicitly works within the electron-hole picture instead of single particle conduction electron-valence electron picture. As a result, the method can be generalized to calculate exciton Zeeman splittings by including the electron-hole Coulomb interaction. We will present the results for CdSe and CdTe nanostructures. The shape and size dependence of the Zeeman splitting will be discussed.

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