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Oscillatory spin-flip rates and anisotropic g-factor in quantum dots CARLOS DESTEFANI, Ohio University/University of Ottawa, SERGIO ULLOA, Ohio University — We study phonon-induced electron spin relaxation rates in parabolic quantum dots (QDs) as function of in-plane and perpendicular magnetic fields as well as of QD lateral and vertical sizes. Rashba and Dresselhaus spin-orbit (SO) couplings are included via exact diagonalization of the model. Deformation and piezoelectric couplings for acoustic phonons are considered, and we show how the former (latter) yields the dominant mechanism in a narrow (wide) gap material. We also report an oscillatory spin-flip rate between QD Zeeman sublevels. In the minima of such rates, quite large spin relaxation times can be obtained in properly designed QDs. The rich interplay between external magnetic fields and intrinsic SO interactions is studied, where two distinct phases are visible in the spectrum of GaAs QDs in perpendicular fields if their vertical width is narrow. We also discuss the QD g-factor strong anisotropy and show how even a sign change can be induced for large magnetic field [1]. Good agreement with available experimental findings is obtained. [1] C. F. Destefani and Sergio E. Ulloa, cond-mat/0411071.

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