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Theory of spin-orbit effects and spin relaxation in single and coupled quantum dots.[1] PETER STANO, University of Regensburg, JAROSLAV FABIAN — Spin-orbit effects and phonon-induced spin relaxation in laterally coupled quantum dots in the presence of magnetic field are investigated by exact numerical diagonalization. Both Bychkov-Rashba and Dresselhaus spin-orbit couplings are included. Several new phenomena are predicted. In particular, we shown that coherent tunneling between the dots depend on the spin, enabling a scheme for spin-to-charge conversion by spin separation in a *homogeneous* magnetic field. Furthermore, we show that spin relaxation is highly anisotropic, both in terms of the direction of the double-dot axis as well as the direction of the magnetic field. The anisotropy comes from spin-orbit coupling. Calculated spin relaxation rates of GaAs single dots agree with a recent experiment.

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