Spin-orbit interaction on the level of individual electrons

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Single electron charge detection in AlGaAs/GaAS heterostructures allows for a precise determination of the tunneling rates into and out of the quantum dot. This leads to a measurement of the level degeneracy of a state, which depends on its occulation and it can be changed by magnetic fields. We furthermore show that charge fluctuations in and out of equilibrium can be measured by implementing feedback loops into the detection setup. For double dots with a well-defined orientation of electron tunneling the strength of spin-orbit interaction can be investigated and tuned on the level of individual electrons.