Nonequilibrium Zeeman-splitting in quantum transport through nanoscale junctions

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We present calculations of the nonequilibrium differential conductance G(V) through a quantum dot as function of bias voltage V and applied magnetic field H. We use a Keldysh conserving approximation for weakly correlated and the newly developed scattering states numerical renormalization group for the intermediate and strongly correlated regime out of equilibrium. In the weakly correlated regime, the Zeeman splitting observable in G(V) strongly depends on the asymmetry of the coupling to the two leads, as well as on particle-hole asymmetry of the quantum dot. In contrast, in the strongly correlated regime, where Kondo-correlations dominate, the position of the Zeeman-split zero-bias anomaly is independent of such asymmetries and always found to be of the order of the Zeeman energy. We will point out the importance of a crossover from the purely spin-fluctuation driven Kondo regime at small magnetic fields to a regime at large fields where the contribution of charge fluctuations induces larger splittings as it was observed in recent experiments.