Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Spectroscopy of the Kondo Problem in a Box DENIS ULLMO, RIBHU KAUL, GERGELY ZARAND, SHAILESH CHANDRASEKHARAN, HAROLD BARANGER, Duke U, Karlsruhe U, Budapest U, and LPTMS Orsay — We study the spin quantum numbers and energy eigenvalues of the ground state and low lying excitations of a quantum dot with a single spin-S impurity. We prove an exact theorem that allows us to infer the ground state spin for an arbitrary spin-S of the impurity and for even/odd electrons on the quantum dot. Additionally, strong and weak coupling perturbation theory backed up with quantum Monte-Carlo simulations enable us to map out the spin structure of the excited states and the energy splittings between them as the ratio Δ/T_K is tuned. We propose a simple transport experiment involving the tunneling spectroscopy of a double quantum dot, where these results can be observed. Finally, we make explicit contact with experiment by calculating the transport properties of the proposed double dot device that exhibit signatures of tunneling into the Kondo-correlated state.

Denis Ullmo
LPTMS, Orsay

Date submitted: 30 Nov 2005 Electronic form version 1.4