Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Spin dynamics in a quantum point contact showing the 0.7-anomaly[1] JAN VON DELFT, FLORIAN BAUER, JAN HEYDER, DENNIS SCHIMMEL, Ludwig-Maximilians-University Munich, CENS/ASC TEAM — The 0.7-anomaly in the first conductance step of a quantum point contact is believed to arise from an interplay of geometry, spin dynamics and interaction effects. Various scenarios have been proposed to explain it, each evoking a different concept, including spontaneous spin polarization, or a quasi-localized state, or ferromagnetic spin fluctuations, or a van Hove ridge (a geometry-induced maximum in the density-of states). Though these scenarios differ substantially regarding numerous details, they all imply anomalous dynamics for the spins in the vicinity of the QPC. We have performed a detailed study of this spin dynamics in the central region of a parabolic quantum point contact, by using the functional renormalization group to calculate the dynamical spin-spin correlation function $\chi(x, x', \omega) = \int_0^\infty \langle S_z(x,t) S_z(x',0)\rangle e^{i\omega t}$. We will discuss its behavior as function of frequency, interaction strength and gate voltage and comment on the implications of these results for each of the above-mentioned scenarios.

[1]We acknowledge support from the DFG through the NIM Excellence Cluster, SFB-TR12, and De730/4-3

Jan von Delft
Ludwig-Maximilians-University Munich

Date submitted: 14 Nov 2014 Electronic form version 1.4