Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Inhomogeneous Spin Chains and Luttinger Liquids NICHOLAS SEDLMAYR, JAN OHST, JESKO SIRKER, SEBASTIAN EGGERT, University of Kaiserslautern — We consider a one-dimensional spin chain with inhomogeneous coupling, which can also be modeled as an inhomogeneous Luttinger liquid. The Luttinger liquid paradigm has proved a very successful theoretical tool for investigating one-dimensional wires. However, there remain open questions about what happens when such a system becomes inhomogeneous. The mapping between the spin chain and the Luttinger liquid allows us to use both numerics and field theory to analyze the problem. Of particular interest is the case where the Luttinger liquid is attached to external leads, as is necessary for example when measuring the conductance of the wire. In this paper we use an abrupt shift in the parameters of the Luttinger liquid to model these connections and see how this affects its behavior. In particular we analyze the relevant back-scattering perturbations at the connections, and identify a case where this relevant operator can be tuned to zero within an otherwise still inhomogeneous system. This of course has consequences not only for transport in the Luttinger liquid system but also for the magnetic susceptibility of the spin chain.

Nicholas Sedlmayr
University of Kaiserslautern

Date submitted: 09 Nov 2011 Electronic form version 1.4