Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Emergence of prominent bound states in the spin-1/2 Heisenberg XXZ chain after a local quantum quench[1]
HANS GERD EVERTZ, MARTIN GANAHL, ELIAS RABEL, Tu Graz, FABIAN ESSLER, University of Oxford — We calculate the non-equilibrium evolution in the spin-1/2 XXZ Heisenberg chain for fixed magnetization after a *local quantum quench*. Initially an infinite magnetic field is applied to n consecutive sites in the center of a large chain, and the ground state is determined. Then the field is switched off and the time evolution of observables such as the z-component of spin is computed using the Time Evolving Block Decimation (TEBD) algorithm. We find that the observables exhibit strong signatures of propagating spinon as well as bound state excitations. These persist even when integrability-breaking perturbations are included. Since bound states ("strings") are notoriously difficult to observe using conventional probes such as inelastic neutron scattering we conclude that local quantum quenches are an ideal setting for studying their properties. We comment on implications of our results for cold atom experiments.

[1]We acknowledge support by the Austrian Science Fund FWF (SFB F41 ViCoM), by EPSRC (grant EP/I032487/1) and by the NSF (KITP, PHY05-51164)

Hans Gerd Evertz
TU Graz

Date submitted: 11 Nov 2011 Electronic form version 1.4