

Low temperature dynamics of nonlinear Luttinger liquids

Jesko Sirker^{*}

sirker@physics.umanitoba.ca

We develop a general nonlinear Luttinger liquid theory to describe the dynamics of one-dimensional quantum critical systems at low temperatures T . To demonstrate the predictive power of our theory we compare results for the autocorrelation $G(t)$ in the integrable XXZ chain with numerical density-matrix renormalization group data and obtain excellent agreement. Our calculations provide, in particular, direct evidence that $G(t)$ shows a diffusion-like decay, $G(t) \sim 1/\sqrt{t}$, in sharp contrast to the exponential decay in time predicted by conventional Luttinger liquid theory.

^{*}Department of Physics and Astronomy, University of Manitoba, Winnipeg, MB R3T 2N2, CANADA.