Non-equilibrium transport in the XXZ spin-1/2 chain

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Dr. Mario Collura
Rudolf Peierls Centre for Theoretical Physics
Oxford

I will considering the recent developments in the non-equilibrium time-evolution of interacting integrable models, thus focusing on the unitary dynamics induced by joining two XXZ spin-1/2 chains with different global properties. Through dephasing, at late times, the state becomes locally equivalent to a stationary state which explicitly depends on position and time.
A kinetic theory of elementary excitations has been proposed to derive a continuity equation which fully characterizes the thermodynamics of the model. The system is prepared in the gapless phase and in different initial conditions: (1) at different temperatures, (2) in the ground state of two different models, and (3) in the “domain wall” state. In this last case a full analytical solution is provided. Excellent agreement between theoretical predictions and numerical simulations, based on iTEBD, has been found. As a corollary, an exact expression for the expectation values of the charge currents in a generic stationary state has been unveiled.