



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

学术报告

Title: Spin dynamics of the axial spin- $\frac{1}{2}$ XXZ chain in longitudinal magnetic field

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Abstract

Although the low energy fractionalized excitations of one dimensional integrable systems are often well-characterized, it remains challenging to explore their quantum dynamics in the gapless region.

We study spin dynamics in the axial spin- $\frac{1}{2}$ XXZ model via the form factor formulae based on the algebraic Bethe ansatz formalism. Various excitations, exhibiting clear energy separations, are identified crucial to the dynamical spin structure factors under the guidance of sum-rules.

The low energy excitations arise from the incommensurate nature of the ground state in the field.

At intermediate and high energies, the two and three-string excitations dominate spin dynamics reflecting the Néel ordered background.

These excitations are observable in spin dynamics experiments opening a new opportunity to study one dimensional quantum dynamics beyond the low energy Luttinger liquid theory in both condensed matter and ultra-cold atom systems.