

## Ground-State and Thermal Entanglement in Three-Spin Heisenberg-XXZ Chain with Three-Spin Interaction

ZHANG Yong<sup>1,2</sup> and LONG Gui-Lu<sup>1,3</sup>

<sup>1</sup> Key Laboratory for Quantum Information and Measurements, Department of Physics, Tsinghua University, Beijing 100084, China

<sup>2</sup> Department of Physics, Beijing University of Posts and Telecommunications, Beijing 100876, China

<sup>3</sup> Key Laboratory for Atomic and Molecular Nano-Sciences, Tsinghua University, Beijing 100084, China

(Received: 2006-7-28; Revised: )

**Abstract:** The entanglement properties of a three-spin XXZ Heisenberg chain with three-spin interaction are studied by means of concurrence of pairwise entanglement. We show that ground-state pairwise entanglement, pairwise thermal entanglement, or quantum phase transition is not present in antiferromagnetic spin chain. For the ferromagnetic case, quantum phase transition takes place at  $\Delta=1$  for anisotropic interaction and at some values of three-spin coupling strength, and pairwise thermal entanglement increases when the value of  $J/T$  increases and with anisotropic interaction and three-spin interaction decrease. In addition, we find that increasing the anisotropic interaction and the three-spin interaction will decrease critical temperature.

PACS: 03.65.Ud, 03.67.Mn

Key words: spin chain, thermal entanglement, quantum phase transition

[\[Full text: PDF\]](#)

Close