Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Iterative Diagonalization of Inhomogeneous Heisenberg Models[1]

VALTER LIBERO, FABIANO SOUZA, Universidade de Sao Paulo — The antiferromagnetic Heisenberg model is one of the most important in describing quantum spins coupled by exchange interactions. Difficulties arise especially in presence of broken symmetry, due for instance to impurities or defects. In these cases, even well-established numerical methods like Lanczos or Monte Carlo, encounter limitations. We propose a numerical method which works even in the absence of translational invariance. We diagonalize the Heisenberg model exploiting the conservation of both the z-component of the total spin and the square of the total spin, a much more complicated procedure but that renders an additional block diagonalization. In essence, the N-site Hamiltonian is built using basis-vectors generated from the direct product of the eigenvectors of the (N-1)-site Hamiltonian and the states of the added N-th spin. The procedure is also applied for the two-leg ladder, an experimental relevant system. Results are shown for ground-state energy and temperature dependent specific heat for chains with local spin impurities or with random distributions of spins 1/2, 1 or 3/2.

[1]We thank CNPq and Fapesp

Valter Libero
Universidade de Sao Paulo

Date submitted: 07 Dec 2008 Electronic form version 1.4