Author: W. M. Brzezicki

Title: **Exact diagonalization approach to the quantum compass model**

I show the results of the Kernel Polynomial Method and modified Lanczos algorithm for the quantum compass model (QCM) [1] on square clusters of the sizes up to 6 x 6. For the largest clusters I apply a spin transformation that maps the L x L cluster to 2(L-1) (L-1) x (L-1) spin models thanks to the special symmetries of the QCM. I explain the structure of the invariant subspaces of the isotropic and anisotropic QCM to determine their number and degeneracies of the energy levels. I show the high--resolution results for the density of states of 5 x 5 and 6 x 6 systems and explain the origin of the two energy scales that emerge in their heat capacity curves. I present the evolution of the whole energy spectrum of 4 x 4 cluster depending on the anisotropy parameter. I compare spin correlations depending on the anisotropy for the clusters up to 6 x 6 and order parameter D as a function of temperature for 4 x 4 and 5 x 5 lattices to conclude about the phase transition observed fo
r larger systems [2].

[1] D. I. Khomskii and M. V. Mostovoy, J. Phys. A 36, 9197 (2003).
[2] S. Wenzel and W. Janke, Phys. Rev. B 78, 064402 (2008).

[1] D. I. Khomskii and M. V. Mostovoy, J. Phys. A 36, 9197 (2003).
[2] S. Wenzel and W. Janke, Phys. Rev. B 78, 064402 (2008).