

Condensed Matter Theory Seminar

- Subject: **Quantum Phase Transitions and Hidden Orders in Low-Dimensional Spin Systems**
- Speaker: **Prof. Gennady Y. Chitov (Laurentian University, Canada)**
- Date & time: **Friday, June 8th, 2012 at 4:15 p.m.**
- Venue: **Seminar room 1.114**
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Abstract:

According to the conventional Landau theory, phases are distinct due to their different symmetries, and a phase transition is always related to a symmetry breaking of the Hamiltonian. The order is described by appropriately chosen local long-range order parameter(s). However, there is a mounting number of examples where the phases and transitions cannot be described by the explicit symmetry breaking and/or local order parameter(s). I will review several known examples of the classical and quantum systems of such type. Then I will discuss our work on the transitions and hidden orders in the dimerized two- and three-leg spin-1/2 ladders. The results of both the mean-field theory and the exact diagonalization technique will be presented. It is shown that the columnar dimerization pattern is never critical, whereas the staggered configuration possesses a quantum critical point. Various gapped phases cannot be distinguished by the local Landau order parameter, but they possess non-local topological string order parameters. We calculate energies, gaps, string order parameters, and yield estimates of the critical exponents. Directions of the future work will be also discussed.

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