



Weekly Seminar

A Comprehensive phase diagram of the square lattice spin-1/2 J1-J2 Heisenberg Antiferromagnet

Ling Wang

Beijing Computational Science Research Center



Time: 16:00pm, Feb. 28, 2018 (Wednesday)

时间: 2018年2月28日 (周三) 下午 16:00

Venue: Room W563, Physics Building, Peking University

地点: 北京大学物理楼 西563

Abstract

We use the DMRG method to calculate several energy eigenvalues of the frustrated $S = 1/2$ square-lattice J1-J2 Heisenberg model on $2L \times L$ cylinders with $L \leq 12$. We identify excited-level crossings versus the coupling ratio $g = J2/J1$ and study their drifts with the system size L . The lowest singlet-singlet and singlet-triplet crossings converge rapidly (with corrections $\propto L^{-2}$) to different g values, and we argue that these correspond to ground-state transitions between the Néel antiferromagnet and a gapless spin liquid, at $gc1 \approx 0.45$, and between the spin liquid and a valence-bond-solid at $gc2 \approx 0.52$. We further use ground state degeneracy, ground state quantum numbers and the domain wall picture to conclusively identify the columnar nature of the intermediate Valence Bond Solid phase.

About the Speaker

Prof. Ling Wang is an world expert of DMRG, Tensor-Network and quantum Monte Carlo simulation method. She received her Ph.D. from Boston University (2009) under the supervision of Anders Sandvik. She went to University of Vienna as a postdoc (2009-2012) and moved to Caltech as an IQIM fellow (2012-2015). In 2015 she joined CSRC as a Assistant Professor. Her research interest is in computational studies on strongly correlated quantum many-body systems, topological phases of matter and many-body localization. .