Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Universal Scaling in the Fan of an Unconventional Quantum Critical Point ROGER MELKO, University of Waterloo, RIBHU KAUL, Harvard University — We present the results of stochastic series expansion Quantum Monte Carlo simulations on a 2D S=1/2 Heisenberg model with additional four-spin interaction – the so-called 'JQ' model [1]. Using extensive simulations on lattice sizes containing in excess of 10^4 spins, we examine the claim that the observed Néel to valence-bond-solid (VBS) quantum phase transition is consistent with the 'deconfined' quantum criticality scenario. We discuss finite-temperature properties of the conjectured quantum critical fan [2], including scaling behavior, the calculation of universal critical exponents, and the apparent emergence of a global U(1) symmetry in the VBS order parameter. Finally, we consider several extensions of the model that may help give further insight into the nature of this unconventional quantum phase transition.

[1] Sandvik, Phys. Rev. Lett. 98, 227202 (2007).
[2] Melko and Kaul, arXiv:0707.2961.

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Date submitted: 26 Nov 2007 Electronic form version 1.4