Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Relevance of Deconfined-Criticality Action in the Light of the J-Q Spin Model[1] YUAN HUANG, KUN CHEN, YOUJIN DENG, Department of Physics, University of Massachusetts, Amherst; University of Science and Technology of China, ANATOLY KUKLOV, Department of Engineering Science and Physics, The College of Staten Island, City University of New York, NIKOLAY PROKOFEV, BORIS SVISTUNOV, Department of Physics, University of Massachusetts, Amherst; Russian Research Center "Kurchatov Institute" — We perform large scale Monte Carlo simulations to study critical flows of 2D spin-1/2 J-Q model and 3D SU(2) symmetric discrete NCCP^1 model, a.k.a. deconfined-critical-point (DCP) action. The flows of the J-Q model and the DCP action collapse in a significantly large region of system sizes (up to L$\sim 60-80$), implying that the DCP theory (in general) and the discrete NCCP^1 model (in particular) correctly capture mesoscopic physics of the competition between the antiferromagnetic and valence-bond orders in quantum spin systems. At larger sizes we observe significant deviations between the two flows which both demonstrate strong violations of scale invariance. Furthermore, while the Neel state is perfectly space-time symmetric, the competing phase shows significant deviations from this symmetry. Possible scenarios are outlined.

[1]NSF PHY-1005543

Yuan Huang
Department of Physics, University of Massachusetts, Amherst;
University of Science and Technology of China

Date submitted: 03 Dec 2012 Electronic form version 1.4