The spin 1/2 J1-J2 Antiferromagnetic Heisenberg model on Square Lattice FRANK VERSTRAETE, LING WANG, Faculty of Physics, University of Vienna, ZHENG-CHENG GU, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, XIAO-GANG WEN, Department of Physics, Massachusetts Institute of Technology, ANDERS SANDVIK, Department of Physics, Boston University, VERSTRAETE'S GROUP COLLABORATION, WEN'S GROUP COLLABORATION, SANDVIK'S GROUP COLLABORATION — We studied the spin 1/2 J1-J2 Heisenberg antiferromagnets on square lattice using the recently proposed cluster update for tensor network states [arXiv:1110.4362]. Ground state wavefunction with tensor network bond dimension upto $D = 9$ was obtained. Through a finite size scaling analysis, we observe a second order phase transition from an antiferromagnetic ordered state to a paramagnetic phase with plaquette valence bond order at a coupling constant ratio J2/J1 0.44. The ground state energies in the thermodynamic limit are in the order of 10^{-3}J1 per site difference from the state of art exact diagonalization study [Eur. Phys. J. B 73, 117 (2010)].

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