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Numerical Schwinger boson approach to the Bethe lattice antiferromagnet at percolation[1] SHIVAM GHOSH, HITESH J. CHANGLANI, CHRISTOPHER L. HENLEY, Cornell University — What are the lowest energy excitations of a spin-1/2 Heisenberg antiferromagnet on a critical percolation cluster? On the square lattice, Wang et al.,[2] discovered anomalously low S=1 excitations, with energy scaling as $\Delta \sim 1/N^2$. Normally the "Anderson tower" would be the lowest, having energy $S(S+1)/2\chi N \sim 1/N$ (χ= transverse susceptibility). These anomalous excitations were attributed to "dangling spins" appearing in parts of the cluster where there was an imbalance of even and odd sites. Here, we look at the diluted z=3 Bethe lattice at the percolation threshold. Previous work confirmed the existence of emergent spin-1/2 degrees of freedom with an effective Heisenberg Hamiltonian but did not explain their origin. New results from DMRG (Density Matrix Renormalization Group) show strong dimerization tendency in the (singlet) ground state, yet there is long-range Neel order on the percolation cluster.[3] To harmonize these results, we set up a numerical Schwinger Boson mean field calculation (with site dependent parameters); we find lowering of mean field energy and spin correlations which agree well with ED and DMRG.

[1]DMR-1005466
[2]Phys. Rev. B 81, 054417 (2010)
[3]A. Sandvik, Phys. Rev. B 66,024418 (2002)

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Shivam Ghosh
sg654@cornell.edu
Cornell University

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