

DMRG Study of the $S > 1/2$ quantum Heisenberg Antiferromagnet on a Kagome-like lattice without loops

Subject area: Kagome systems

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We consider the quantum Heisenberg antiferromagnet for $S \geq 1/2$ on the Husimi cactus, a graph of corner sharing triangles each of whose centers is a vertex of a Bethe lattice. Our focus is the possible transition(s) as S is increased from an expected spin liquid at $S = 1/2$ to the coplanar ordered state known to be stable in the large S limit [1]. Since the geometry is like the Kagome lattice locally, properties dominated by nearest-neighbor spin correlations should be captured by the same interactions on the Husimi cactus; on the other hand, the cactus lacks loops, so properties dependent on them cannot be captured.

Our method is a DMRG procedure tailored for tree graphs, well suited to our models; by contrast, such $S > 1/2$ models are almost intractable by exact diagonalization on the kagome lattice.

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[1] B. Doucot and P. Simon, J. Phys. A **31**, 5855-5886 (1998).