

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

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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. 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. As a proof of principle we also investigate the quantum XXZ model with on-site anisotropy for  $S = 1$ .

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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