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Scaling of entanglement entropy in the 2D Heisenberg ground state

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I will describe a new quantum Monte Carlo algorithm used to measure entanglement entropy in the ground state of the 2D Heisenberg model. This algorithm, operating in the valence bond basis, combines aspects of its two predecessors, efficient loop sampling and ratio weighting, to maximize efficiency. The results from the algorithm are used to study the scaling of entanglement entropy is this system. We uncover the surprising result that finite-size scaling supports a logarithmic correction to the entropic area law which resembles a 1D "conformal distance". This behavior has also been observed in recent simulations of the RVB wavefunction, suggesting it maybe be a common feature of gapless states.

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