

# Quantum Phases and Entanglement Renyi Entropy

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We investigate crossing behavior of ground state entanglement Renyi entropies of quantum critical systems. We find a novel property that the ground state in one quantum phase cannot be locally transferred to that of another phase, that means a global transformation is necessary. This also provides a clear evidence to confirm the long standing expectation that entanglement Renyi entropy contains more information than entanglement von Neumann entropy. The method of studying crossing behavior of entanglement Renyi entropies can distinguish different quantum phases well. We also study the excited states which still give interesting results.

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