Thermal vs. Entanglement Entropy: A Measurement Protocol for Fermionic Atoms with a Quantum Gas Microscope

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arXiv:1302.1187v1

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http://arxiv.org/abs/1302.1187 [2]

We show how to measure the order-two Renyi entropy of many-body states of spinful fermionic atoms in an optical lattice in equilibrium and non-equilibrium situations. The proposed scheme relies on the possibility to produce and couple two copies of the state under investigation, and to measure the occupation number in a site- and spin-resolved manner, e.g. with a quantum gas microscope. Such a protocol opens the possibility to measure entanglement and test a number of theoretical predictions, such as area laws and their corrections. As an illustration we discuss the interplay between thermal and entanglement entropy for a one dimensional Fermi-Hubbard model at finite temperature, and its possible measurement in an experiment using the present scheme.

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- 03.20.+w Entanglement detection/witnesses [4]
- Result [5]
- 01.50.+e Entropy and other measures of information [6]
- 04.80.+d Entanglement dynamics in composite quantum systems [7]
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