
GILLES PAREZ, Université de Montréal

The range of entanglement

The investigation of entanglement in quantum many-body systems is a prominent research area, at the intersection of condensed matter, statistical mechanics and quantum information. In particular, quantifying entanglement in quantum critical systems provides us with strong insights regarding universal features of the phase transition. Due to the power-law decay of correlations at quantum critical points, it is generally believed that these systems exhibit long-range entanglement between separated regions. In this talk, I will challenge this basic idea by showing that the long-distance entanglement depends greatly on the bosonic or fermionic nature of the model: bosonic theories lack such entanglement, while theories with fermions are substantially more entangled. I will also discuss the generalization of these results to the important case of multipartite systems.

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