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STATISTICAL PROPERTIES OF ENTANGLEMENT IN LARGE QUANTUM SYSTEMS

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Abstract:

The entanglement of the pure states of a large quantum system is investigated by applying the tools of statistical mechanics. The spectral distribution of the bipartite entanglement is computed by mapping the problem onto a random matrix model and by using a Coulomb gas method due to Dyson. Entanglement exhibits a rich structure, with three different regimes, corresponding to two phase transitions of the matrix model. The two critical points are associated with sudden changes in the shape of the entanglement spectra.

We also briefly touch upon the characterization of multipartite entanglement and the search for maximally multipartite entangled states, highlighting the links with frustration.