Quasi-Local Entanglement Measures across the Mott Transition

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Abstract Using advanced computation and analytic methods, we construct a quantum information outlook of the correlated phases near the Mott insulating state in strongly interacting electrons systems.

The development of concepts in quantum information theory provides us with new perspectives to explore the complex phases of correlated systems. Many of these phases are believed to originate from their proximity to the Mott insulating state, which gives it special significance. In this context, after a brief introduction to the key ideas of entanglement measures, we address the emergence of strong quantum entanglement between nearby atomic orbitals within the Mott phase. By combining state-of-art cluster computational methods with analytical tools from quantum information theory, we analyse the interaction-driven Mott transition and the subsequent formation of pseudo-gap states upon doping. Exploiting super-selected measures of entanglement we demonstrate the emerging importance of spatially separated pair-wise quantum correlations.