

Entanglement spectrum of one-dimensional extended Bose-Hubbard model

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The entanglement spectrum provides crucial information about correlated quantum systems. We show that the study of the block-like nature of the reduced density matrix in number sectors and the partition dependence of the spectrum in finite systems leads to interesting unexpected insights, which we illustrate for the case of a 1D extended Hubbard model. We show that block symmetry provides an intuitive understanding of the spectral double degeneracy of the Haldane-insulator, revealing as well partial double degeneracy for the Mott-insulator. Moreover, surprisingly, the partition dependence of the spectral degeneracy in the Haldane- and Mott-insulator is directly linked to the, in principle unrelated, density-density correlations, and presents an intriguing periodic behavior in superfluid and supersolid phases.