Contribution ID: **34** Type: **Poster**

Phase Diagram Detection via Gaussian Fitting of Number Probability Distribution

Monday, 11 September 2023 22:40 (20 minutes)

In recent years, methods for automatic recognition of phase diagrams of quantum systems have gained large interest in the community: Among others, machine learning analysis of the entanglement spectrum has proven to be a promising route. Here, we discuss the possibility of using an experimentally readily accessible proxy, namely the number probability distribution that characterizes sub-portions of a quantum many-body system with globally conserved number of particles. We put forward a linear fitting protocol capable of mapping out the ground-state phase diagram of the rich one-dimensional extended Bose-Hubbard model: The results are quantitatively comparable with more sophisticated traditional numerical and machine learning techniques. We argue that the studied quantity should be considered among the most informative and accessible bipartite properties.

Phys. Rev. B 107, L121403

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Session Classification: Poster Session II

Track Classification: Other