
SEMINAR: Matrix product state approximations to quantum states of low energy-variance

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12:00 to 13:00

Seminar Room

In this work, we show how to efficiently simulate pure quantum states in one dimensional systems that have both finite energy-density (i.e. in the bulk of the spectrum) and vanishingly small energy fluctuations. We analyze a tensor network algorithm that produces matrix product states whose energy-variance decreases as the bond dimension increases. Our results imply that variances as small as $1 / \log N$ can be achieved with polynomial bond dimension. This establishes that there exist states with a very narrow support in the bulk of the spectrum that still have moderate entanglement entropy, in contrast with typical eigenstates that display a volume law. Our main technical tool is a Berry-Esseen theorem for spin systems, which strengthens central limit behavior for the energy distribution of product states.

Hosted by: Prof. Dr. Antonio Acin