



CONDENSED MATTER THEORY SEMINAR

Quasi-localized excitations induced by confinement in translationally-invariant quantum chains

Alessio Lerose, SISSA (Trieste)

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Abstract:

We show that quantum confinement can induce spatial quasi-localization of excitations and slow dynamics even in the absence of quenched disorder. By means of numerical computations based on matrix-product-states and exact diagonalization, we study the non-equilibrium evolution in quantum Ising chains with longitudinal fields, in long-range quantum Ising chains, and in $U(1)$ lattice gauge theories in $(1+1)$ -dimensions. We demonstrate the emergence of regimes characterized by quasi-many-body-localization and long-lived excitations at high energy. We capture these anomalous non-equilibrium dynamics via effective analytical descriptions or via exact mappings to models exhibiting weak ergodicity breaking. These phenomena can be tested in quantum simulators with trapped ions and Rydberg atoms.