Loss-induced quantum information jet in an infinite temperature Hubbard chain

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Information propagation in the one-dimensional infinite temperature Hubbard model with a dissipative particle sink at the end of a semi-infinite chain is studied. In the strongly interacting limit, the two-site mutual information and the operator entanglement entropy exhibit a rich structure with two propagating information fronts and superimposed interference fringes. A classical reversible cellular automaton model quantitatively captures the transport and the slow, classical part of the correlations, but fails to describe the rapidly propagating information jet. The fast quantum jet resembles coherent free particle propagation, with the accompanying long-ranged interference fringes that are exponentially damped by short-ranged spin correlations in the many-body background. We identify the carrier of the fast front as a coherently moving spinless fermion, propagating on an infinite temperature spin texture [1].

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