ON THE OPTIMAL RATE OF CONVERGENCE FOR TRANSLATION-INVARIANT 1D QUANTUM WALKS

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We study the convergence rate of translation-invariant discrete-time quantum dynamics on a one-dimensional lattice. We prove that the cumulative distributions function of the ballistically scaled position $X(t)/t$ after t steps converges at a rate of $t^{-1/3}$ in the Lévy metric as $t \to \infty$. In the special case of step-coin quantum walks with two-dimensional coin space, we recover the same convergence rate for the supremum distance and prove optimality.

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