

$$S_t \circ c(h)(a_s)_{ti} c(s) + \mathfrak{S}_e m^i n(a_r)$$

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Quantum random walks on the two-dimensional lattice

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Quantum random walks were first defined in the 1990's as possible elements of quantum computing machines. Their most notable characteristic is ballistic behavior $E|X_n| = \mathcal{O}(n)$, as opposed to the diffusive behavior of classical random walks.

QRW has been studied primarily in one dimension. This talk describes work (joint with A. Bressler, W. Brady and Y. Baryshnikov) in which we compute limit laws for two-dimensional QRW. We also unify some results on one-dimensional QRW, give insights into the occasional existence of bound states, and give an interpretation of the limit shapes as projections of certain 2-tori embedded in the 3-torus. An example is given in the accompanying picture.

