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Transport properties of kicked and quasiperiodic Hamiltonians. (English summary)

Summary: “We study transport properties of Schrödinger operators depending on one or more parameters. Examples include the kicked rotor and operators with quasiperiodic potentials. We show that the mean growth exponent of the kinetic energy in the kicked rotor and of the mean square displacement in quasiperiodic potentials is generically equal to 2. This means that the motion remains ballistic, at least in a weak sense, even away from the resonances of the models. Stronger results are obtained for a class of tight-binding Hamiltonians with an electric field $E(t) = E_0 + E_1 \cos \omega t$. For

$$H = \sum a_{n-k}(|n-k\rangle\langle n| + |n\rangle\langle n-k|) + E(t)|n\rangle\langle n|$$

with $a_n \sim |n|^{-\nu}$ ($\nu > 3/2$) we show that the mean square displacement satisfies $\langle \psi_t, N^2\psi_t \rangle \geq C_\epsilon t^{2/(\nu+1/2) - \epsilon}$ for suitable choices of $\omega, E_0$, and $E_1$. We relate this behavior to the spectral properties of the Floquet operator of the problem.”  

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