DYNAMICAL LOCALIZATION FOR D-DIMENSIONAL RANDOM QUANTUM WALKS

Alain Joye

Université Grenoble 1

We consider a d-dimensional random quantum walk with site-dependent random coin operators. The corresponding transition coefficients are characterized by deterministic amplitudes times independent identically distributed site-dependent random phases. When the deterministic transition amplitudes are close enough to those of a quantum walk which forbids propagation, we prove that dynamical localization holds for almost all random phases. This instance of Anderson localization implies that all quantum mechanical moments of the position operator are uniformly bounded in time and that spectral localization holds, almost surely.

Keywords: Random quantum walks, Dynamical localization, Fractional moments estimates