Quantum thermalization: Anomalous slow relaxation due to percolation-like dynamics

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We highlight a dynamical anomaly in which the rate of relaxation towards thermal equilibrium in a bi-partite quantum system violates the standard linear-response (Kubo) formulation, even when the underlying dynamics is highly chaotic. This anomaly originates from an $\hbar$-dependent sparsity of the underlying quantum network of transitions. Using a minimal bi-partite Bose-Hubbard model as an example, we find that the relaxation rate acquires an anomalous $\hbar$ dependence that reflects percolation-like dynamics in energy space.