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Quantum dynamics of a spin chain in the presence of engineered collective noise CHRISTOPHER ZEITLER, LAUREL E. ANDERSON, LORENZA VIOLA, CHANDRASEKHAR RAMANATHAN, Dartmouth College — We experimentally and theoretically investigate the effect of engineered collective noise on the quantum dynamics of a spin chain evolving under the double-quantum Hamiltonian. This Hamiltonian is related by a similarity transformation to the isotropic XX Hamiltonian, and is experimentally accessible in solid-state NMR using coherent averaging techniques. In the absence of noise, a localized magnetic moment is observed to move down the chain at a constant velocity. We show that this transport is disrupted by the presence of collective z-noise, and that the magnetic moment becomes localized at the initial site as the strength of the noise increases. The relevance to quantum information transport in spin chains is also discussed.

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