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Bad-metal relaxation dynamics in a Fermi lattice gas[1]

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Electrical current in conventional metals is carried by electrons that retain their individual character. Bad metals, such as the normal state of some high-temperature superconductors, violate this scenario, and the complete picture for their behavior remains unresolved. I will describe transport measurements consistent with bad metal phenomena for ^{40}K atoms trapped in an optical lattice. In this system described by the Hubbard model, we measure the transport lifetime for a spin-selective mass current excited by stimulated Raman transitions. We demonstrate incompatibility with weak-scattering theory and key characteristics of bad metals: anomalous resistivity scaling consistent with T-linear behavior, the onset of incoherent transport, and the approach to the Mott-Ioffe-Regel limit. I will also briefly discuss recent measurements of the influence of disorder on doublon decay in this system.

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