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Anderson Localization of Ultracold Fermionic K JOSHUA ZIRBEL, STANIMIR KONDOV, WILLIAM MCGEHEE, BRIAN DEMARCO, University of Illinois at Urbana-Champaign — We experimentally observe stationary, exponential localization of spin-polarized ultracold fermionic atoms in the presence of a 3-D disordered potential generated from optical speckle. A localized component and a mobile component of the gas emerge after release from a harmonic trap into the speckle potential. The density of the localized component decays exponentially in space with a decay constant depending on the initial temperature of the gas, while the mobile component expands ballistically. Exact numerical simulation of classical trajectories in the 3D potential has excluded diffusion or a percolation threshold as possible explanations. The exponential localization in combination with the presence of a mobility edge, indicated by the temperature dependence of the fraction of the cloud localized, make our observations qualitatively consistent with Anderson localization in 3D.

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