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Quantum quenches of cold-atom gases in optical lattices: the influence of Anderson localization CHRIS HOOLEY, SUPA, University of St Andrews, JORGE QUINTANILLA, University of Kent, UK, VITO SCAROLA, Virginia Tech, USA — We consider the following kind of non-equilibrium experiment. An ultracold fluid of fermions is prepared in a potential consisting of three parts: an optical lattice; a short-range-correlated disorder potential of finite strength; and a shallow harmonic trapping potential. After the fluid has equilibrated, the minimum of the harmonic potential is suddenly "jumped" to the side by a finite distance, d. The observables of interest are the subsequent evolution of the density distribution and phase correlations in the fluid. This kind of experiment is theoretically interesting because it contains two energy-dependent length scales: the localization length of the single-particle orbitals due to the disorder potential, ξ; and the "Bragg localization length" of the single-particle orbitals due to the combined effect of the harmonic trap and optical lattice, l_B. We present numerical results on the evolution of the density distributions and phase correlations in such cases, for a range of strengths of the disorder. In addition, we provide an approximate analytical framework for understanding our results in terms of the relative size of the length scales ξ and l_B at the Fermi energy. Possibilities for further work are also discussed.

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