The energy cost of local rearrangements makes glasses solid

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Which phenomenon slows down the dynamics in super-cooled liquids and turns them into glasses is a long-standing question of condensed-matter. Most popular theories posit that the dynamics becomes cooperative as the temperature decreases: many events must occur in a coordinated fashion on a growing length scale for relaxation to occur. Instead, other approaches consider that local barriers associated with the elementary rearrangement of a few particles or `excitations' govern the dynamics. Here we resolve this conundrum by introducing a new algorithm, SEER, that can systematically extract hundreds of excitations and their energy from any given configuration. Remarkably, we find at low temperatures that the excitation density of states is essentially shifted to higher energy under cooling. This observation directly predicts how local barriers slow down the dynamics, assuming no cooperative effects. We test this prediction in numerical super-cooled liquids using swap algorithms, allowing us to measure the relaxation time up to milliseconds. The agreement is quantitative, revealing that cooperative effects are absent and leading to new perspectives on the glass transition.