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Relaxation Mode Analysis and Scale-Dependent Energy Landscape Statistics in Liquids ZHIKUN CAI, YANG ZHANG, Univ of Illinois - Urbana — In contrast to the prevailing focus on short-lived classical phonon modes in liquids, we propose a classical treatment of the relaxation modes in liquids under a framework analogous to the normal mode analysis in solids. Our relaxation mode analysis is built upon the experimentally measurable two-point density-density correlation function (e.g. using quasi-elastic and inelastic scattering experiments). We show in the Laplace-inverted relaxation frequency z-domain, the eigen relaxation modes are readily decoupled. From here, important statistics of the scale-dependent activation energy in the energy landscape as well as the scale-dependent relaxation time distribution function can be obtained. We first demonstrate this approach in the case of supercooled liquids when dynamic heterogeneity emerges in the landscape-influenced regime. And then we show, using this framework, we are able to extract the scale-dependent energy landscape statistics from neutron scattering measurements.

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