

Vibrational dynamics in amorphous materials

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In contrast to crystalline solids, where structural order governs dynamics and thermodynamics, the lack of long-range periodicity in amorphous materials is responsible for several unexpected properties. We combine experimental (inelastic scattering of light, neutrons and X-rays), computational (ab-initio and classical molecular dynamics) and theoretical (field techniques) methods to study anomalies in the dynamics such as non-linear dispersion relation of acoustic excitation, non-quadratic frequency dependence of sound attenuation, non-Debye vibrational density of states. Recent theoretical predictions have been reported in *Physical Review Letters* , while an experimental determination of the vibrational density of states at the surface of an amorphous material is reported in *Nature Communications* .