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Boson Peak in Plastic Crystals SEBASTIAN EMMERT, PETER LUNKENHEIMER, ALOIS LOIDL, Experimental Physics V, Center for Electronic Correlations and Magnetism, University of Augsburg, Germany — We present dielectric permittivity data of numerous glassy systems, spanning an extremely broad frequency range. By combining dielectric, terahertz-time-domain, and Fourier-transform-far-infrared spectroscopy, a range from a few μHz to several THz is covered.

Focus is laid on an absorption that quite universally dominates such spectra at terahertz frequencies. This interesting feature also shows up in other, complementary measurement techniques such as inelastic neutron and light scattering as well as in calorimetric measurements, where it manifests as an excess term in the specific heat. Since its temperature dependent amplitude in the scattering experiments can be described by the Bose-Einstein statistics, it is sometimes referred to as 'boson peak'. Despite its universality, its microscopic origin is still a matter of debate.

To shed some light on this issue, we concentrate on the so-called plastic crystals, which consist of dipolar molecules that form a regular crystal lattice but are still disordered concerning their rotational degrees of freedom. By thoroughly studying the evolution of the boson peak under temperature variation and by comparing it to the results for canonical glass formers, valuable insights into its true nature are gained.

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