

“Isotropic to anisotropic elasticity transition and amorphous order in network glasses”

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I will discuss the results of a series of inelastic x-rays scattering experiments performed on vitreous silica at various densities and on its parent polycrystalline aggregates, α -quartz and α -cristobalite. The main result of our work is the observation of a particularly large static length, $\xi \sim 20$ interatomic distances, connected to the size of the elastic heterogeneities in the glass. The glass behaves elastically as a continuum medium at large wavelengths, $\lambda \gg \xi$. The atomic vibrations feel the microscopic details of the structure when $\lambda \sim \xi$ and their spectrum becomes almost indistinguishable from that of the corresponding polycrystal as the frequency is increased further. Here the glass shows a rich vibrational spectrum, which includes the three acoustics and the optic modes of the crystal averaged over the wave-vector orientations.