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Influence of pressure (density) on fast dynamics in polymers LIANG HONG, BURAK BEGEN, ALEXANDER KISLIUK, ALEXEI SOKOLOV, University of Akron, DR SOKOLOV'S GROUP TEAM — Understanding the microscopic nature of the fast dynamics in disordered materials is still a challenge. In particular, the origin of the collective vibrations, the so-called Boson peak, remains a subject of active discussion. It's known that Boson peak spectra change significantly under pressure. Analysing the role of density in the Boson peak might help to unravel its microscopic nature. In this work, we use light scattering to study influence of pressure (up to 1.5GPa) on fast dynamics in different polymers. In all cases, the observed shift of the Boson peak frequency with pressure is significantly stronger than change of sound velocities. This result clearly indicates that elastic continuum approximation cannot describe the pressure-induced variations. We demonstrate that the main variation of the Boson peak amplitude is due to changes of the Debye level, although detailed quantitative analysis is not possible due to the light-to-vibration coupling coefficient, which also varies with pressure. Analysis also shows there is a correlation between pressure-induced changes in the Boson peak frequency and amplitude.

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