Density of states of interacting quasilocal harmonic modes in glasses.

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We have established for a first time that as a result of a bilinear coupling between quasilocal harmonic modes and phonons in glasses there should be always a correlation between position of the boson peak and Ioffe-Regel crossover frequency for phonons. Above this frequency phonons (i.e. usual plane waves) cease to exist. At the same frequency density of states of quasilocal harmonic modes as a result of their interaction (and strong level repulsion) transforms into universal linear function of frequency. As a result the new harmonic modes become completely delocalized and have a diffusive nature. We show that existing experimental data are in an excellent agreement with these predictions.