

# Coexistence of two Density Fluctuation Modes in Molten Binary Alloys

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We will present a clear experimental observation of the existence of the “*fast and slow sound* phenomenon” in binary systems with disparate mass components. Taking advantage of the Brillouin neutron scattering technique we simultaneously resolved two distinct density-fluctuation modes in the dynamic structure factor of the liquid metal alloy  $\text{Li}_{30}\text{Bi}_{70}$ . A straightforward study of the dynamic structure factor leads to the determination of two distinct branches in the dispersion curve, describing the decoupled dynamics of the light and heavy components at high frequency. We also present some unpublished results of an IXS experiment on liquid  $\text{Li}_x\text{Mg}_{1-x}$  alloys at the crossover between hydrodynamic and high frequency regime. We finally discuss some hints provided by simulations (MD and *ab initio*) of  $\text{Li}_x\text{Bi}_{1-x}$  alloys and by the application of a theoretical model describing the frequency response of the equivalent crystal with mass and force-constants disorder.