

Phonon dispersion studies of crystalline systems using high energy resolution Inelastic X-ray Scattering (IXS)

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Inelastic X-ray Scattering (IXS) with *meV* energy resolution has become in the last ten years a valuable spectroscopic tool, complementing the well established coherent *Inelastic Neutron Scattering* (INS) techniques. In the study of crystalline systems IXS is the tool of choice in cases where either samples are available only in small quantities or where samples are studied under very high pressure. At the *European Synchrotron Radiation Facility* (ESRF), there are currently two beam-lines (ID16 and ID28) fully dedicated to phonon spectroscopy. In order to illustrate the present state of the art, we present some experiments that have been recently conducted on the two beam-lines. These comprise very accurate measurements of the longitudinal acoustic phonons in diamond (M. d'Astuto *et al.* in preparation), phonons in quasi-crystals (R. Brand *et al.* submitted to *Phys. Rev. B*) and high Tc materials (M. d'Astuto *et al.* unpublished results), pressure-dependent studies of the acoustic dynamics in single crystals of argon and Ice VII (F. Ocelli *et al.*, *Phys. Rev. B*, in print; P. Loubeyre *et al.* in preparation) and the determination of the sound velocity in iron up to 110 *GPa* (G. Fiquet *et al.*, *Science* **5503** (2001) 468).