Phonon dispersion and lifetime in superconductors studied by Inelastic X-ray Scattering (IXS)

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Phonon dispersion and lifetime are important data in order to model the electron-phonon coupling in superconductors. The standard technique for such measurements, inelastic neutron scattering, require large volume single crystals, which are not always available. In particular, this is the case for some cuprate, and for MgB_2 and Na_xCoO_2 •yH_20, two systems newly discovered as superconductors. Recently, inelastic x-ray scattering has emerged as a possible alternative [1], effective even with sample sizes of few tens of microns [2]. We will show the results obtained in this way in electron-doped [1,3,4] and hole doped [5,6] perovskite cuprate, MgB_2 [2,7] and $Mg_xAl_{(1-x)}B_2$ [8]. We will discuss open questions and perspectives.

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