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Resonance properties in optimally and overdoped Y-123 - investigation of phonons and the electronic background M. RUEBHAUSEN, S. MUELLER[1], R. MAESER, B. SCHULZ, I. MAHNS, D. BUDELMANN, University of Hamburg, Germany, M.V. KLEIN, University of Illinois at Urbana-Champaign, Urbana Il, USA, D. BONN, W. HARDY, R. LIANG, University of British Columbia, Vancouver, Canada — We have studied the variation of the 2Δ-gap like features and the phonons in optimally to overdoped Y-123 with incident photon energy E_i. The optimally doped YBCO and overdoped YBCO exhibit a complex behavior in the gap feature when the incident photon energy is tuned from 1.8 eV to above 5 eV. Our results highlight the composite nature of the 2Δ-gap like peaks in the HTS. Below the superconducting T_c we see a modification of spectral weight and the appearance of the 2Δ like features. In B_{1g} Raman symmetry these features change their shape, peak position, and intensity with increasing E_i. For E_i 3.5 to 4 eV we find little redistribution, only a strong new peak at Raman frequencies well above the accepted values of twice Δ_{max}. This peak is located at 620 cm^{-1} in optimally doped samples, it shifts to lower energies and broadens in overdoped materials. The matrix element of this peak shifts as a function of doping by 0.2 eV to higher incident photon energies, outlining the interplay between the local electronic structure and superconductivity. Strong resonances of the chain disorder-induced phonons appear at around 4.1 eV, which are absent in the overdoped material.

[1]Talk will be given by this author

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