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Bond-stretching phonon mode in stripe ordered orthorhombic $\text{Nd}_{1.67}\text{Sr}_{0.33}\text{NiO}_4$. M. HÜCKER, Brookhaven National Laboratory, T. FUKUDA, Japan Atomic Energy Research Institute (JAERI), SPring-8, G. D. GU, J. M. TRANQUADA, Brookhaven National Laboratory, A. Q. R. BARON, Japan Synchrotron Radiation Research Institute (JASRI), SPring-8, J. P. HILL, Brookhaven National Laboratory — Inelastic x-ray scattering (IXS) experiments on $\text{Nd}_{1.67}\text{Sr}_{0.33}\text{NiO}_4$ have been performed to study electron-phonon interactions in this charge stripe ordered nickelate. Resurgent interest in such phenomena has been triggered by recent results on the high temperature superconductors, where a kink in the electron dispersion as well as striking anomalies in high-energy optical phonon modes have been observed. A significant softening of the bond-stretching-phonon mode for $Q||[100]$ was also observed in the tetragonal nickelate $\text{La}_{1.69}\text{Sr}_{0.31}\text{NiO}_4$ with inelastic neutron scattering. Moreover, this compound shows an apparent splitting of the bond-stretching mode along the $[110]$ direction. Here we present first IXS results for $Q||[110]$ on the orthorhombic compound $\text{Nd}_{1.67}\text{Sr}_{0.33}\text{NiO}_4$, which is characterized by domains with unidirectional stripe order. By probing different spots on the sample with different domain distribution, a weak contrast between the phonon spectra has been observed. We discuss these differences in terms of phonons propagating parallel and perpendicular to the stripe direction, as well as the anisotropic, i.e. orthorhombic, lattice structure.

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