

Abstract Submitted
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Unconventional response of acoustic phonons to the onset of charge order in a bilayer manganite S. ROSENKRANZ, Argonne National Laboratory, F. WEBER, Karlsruhe Institute of Technology, J.P. CASTELLAN, R. OSBORN, H. ZHENG, J.F. MITCHELL, Argonne National Laboratory, S. CHI, J.W. LYNN, NIST Center for Neutron Research, D. REZNIK, University of Colorado, Boulder — The acoustic phonons in the 50% doped bilayer manganite $\text{LaSr}_2\text{Mn}_2\text{O}_7$ exhibiting CE type charge order were investigated using inelastic neutron scattering. At the onset of charge ordering, we observe an abrupt increase of the energies and a decrease of the linewidths of the transverse mode along $(1,1,0)$, which crosses the CE ordering wavevector. This effect is however not localized to the CE ordering wavevector, but is observed over an extended range of momentum transfers, for which the phonon energy is lower than 15 meV. These observations indicate a reduced electron-phonon coupling due to a partial removal of the Fermi surface and provide direct evidence for a link between electron-phonon coupling and charge order in manganites. However, the observed response of the phonons is not consistent with a standard CDW mechanism, clearly showing that the transition is unconventional.

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