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Gapped sliding phononic modes in the incommensurate structure of the ladder-chain system $Sr_{14}Cu_{24}O_{41}$ ADRIAN GOZAR, CHRISTOPHER HOMES, Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory, Upton, New York 11973, USA, GIRSH BLUMBERG, Department of Physics and Astronomy, Rutgers, The State University of New Jersey, Piscataway, New Jersey 08854, USA, VERNER THORSMOLLE[1], HENRIK RONNOW, Laboratory for Quantum Magnetism, Ecole Polytechnique Federale de Lausanne (EPFL), CH-1015, Switzerland — We report on low energy Raman and infra-red (IR) excitations in $Sr_{14}Cu_{24}O_{41}$. Two modes are observed starting from room temperature in the 1-2 meV range. One is a fully symmetric Raman mode and the other, observed in c-axis reflectance, is an excitation carrying a dipole moment along the chain/ladder direction. We associate these modes with the gapped c-axis sliding motions of the charged, incommensurate CuO_2 chains and $Sr_2Cu_2O_3$ ladder layers. This approach is able to quantitatively explain the range and relative energies of these excitations which are sensitive probes of the charge and spin density-wave ordering in the "14-24-41" systems.

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