## Abstract Submitted for the MAR08 Meeting of The American Physical Society

Elastic properties of the transition metal oxides  $Ca_{2-x}Sr_{x}RuO_{4}$ YANBING LUAN, VEERLE KEPPENS, The University of Tennessee, RONGYING JIN, DAVID MANDRUS, Oak Ridge National Laboratory, THE UNIVERSITY OF TENNESSEE TEAM, OAK RIDGE NATIONAL LABORATORY COLLAB-ORATION — Layered perovskite ruthenates have attracted considerable interest since the discovery of superconductivity in  $Sr_2RuO_4$ , the only copper-free superconductor isostructural to the cuprates. Among the doped varieties of  $Sr_2RuO_4$ , the  $Ca_{2-x}Sr_{x}RuO_{4}$  series is heavily studied, as it connects the Mott insulator  $Ca_{2}RuO_{4}$ with the superconductor  $Sr_2RuO_4$  and exhibits a variety of physical properties. The current work focuses on the elastic properties of  $Ca_{2-x}Sr_{x}RuO_{4}$ . Resonant Ultrasound Spectroscopy (RUS) has been used to study the elastic response of the samples, and results are presented for single crystals with x = 0.2, 0.3, 0.4, 0.5, 1, 1.5, 1.9 and 2.0. The temperature-dependence of the elastic behavior is found to be quite unusual and reflects the rich phase diagram of these materials. Almost all measured  $Ca_{2-x}Sr_{x}RuO_{4}$  samples show a soft phonon mode at low temperatures, which is believed to be associated with the dynamics of the  $RuO_6$  octahedra.

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