Resonant Ultrasound Studies of Quasi-2D Na$_x$CoO$_2$ (0.7 \leq x \leq 0.77) TIMOTHY CAGLE, VEERLE KEPPENS, Department of Materials Science and Engineering, The University of Tennessee, RONGYING JIN, Materials Science and Technology Division, Oak Ridge National Laboratory — Cobalt-based oxides have been shown to represent a new paradigm for a good thermoelectric material. These materials violate all of the traditional guidelines to help identify a potentially good thermoelectric material. In order to obtain a better understanding of its physical properties, we have initiated the synthesis of layered Na$_x$CoO$_2$, and started a study of the elastic properties of these materials using Resonant Ultrasound Spectroscopy (RUS). In this work, we discuss our results for sodium cobaltate compounds with 0.7 \leq x \leq 0.77. Single crystals were successfully grown in a floating-zone furnace, and the elastic constants have been measured as a function of temperature (5-300K) and in magnetic fields up to 5 Tesla. The resulting plots of elasticity vs. temperature clearly reflect a transition below 50 K, which is believed to be associated with rearrangement of the Na-atoms between the CoO$_2$ planes.