Abstract Submitted
for the TSF16 Meeting of
The American Physical Society

Towards Using Resonant Ultrasound Spectroscopy (RUS) to Investigate Spin-Lattice Couplings in Magnetic Materials TYLER DODGE, KATE ROSS, Colorado State University — All materials have fundamental frequencies at which they naturally vibrate. Resonant ultrasound spectroscopy (RUS) is a measurement technique in which a solid is vibrated at a range of frequencies in search for resonance within the material. A RUS measurement is intended to discover the elastic properties of the material, which are described by an elastic tensor consisting of up to 21 unique elastic constants. These elastic constants are the description of the material's feedback to enforced stress, and they originate from the effective "stiffness" of the crystal lattice due to bonding and atomic interactions. The samples' elastic properties change depending on properties of the specimen such as crystallinity, symmetries, temperature, and magnetic state (e.g. ferromagnet vs. paramagnet). The goal of our research is to identify the coupling of magnetic moments to the crystal lattice through temperature and magnetic field dependent RUS measurements. To do this we must integrate a RUS probe with the Central Instrument Facility's (CIF's) Physical Property Measurement System (PPMS), which will allow low temperature and high magnetic field scans. By modeling the way crystals elastic constants change with respect to temperature and field, we can better understand magnetoelastic coupling effects and their role in quantum magnetic phenomena.

Tyler Dodge
Colorado State University

Date submitted: 23 Sep 2016 Electronic form version 1.4