

# Spectroscopic investigation of materials under extreme conditions

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The interplay between structure and magnetism is of great current interest because it underpins different types of functionality in complex materials. Contrary to previous expectation, we are discovering that many magnetic transitions take place with important elastic effects. Examples include simple low temperature magnetic ordering transitions, magnetic quantum critical transitions, pressure-driven magnetic dimensionality crossovers, and systems in which finite length scale effects can be explored. This talk will focus on the use of vibrational spectroscopy to reveal local lattice distortions and coupling constants associated with magnetoelastic transitions in a variety of materials including Mn(dca)<sub>2</sub>, Co(dca)<sub>2</sub>, Cr(Ru<sub>2</sub>)<sub>3</sub>, Cu(py<sub>z</sub>)(NO<sub>3</sub>)<sub>2</sub>, Cu(py<sub>z</sub>)F<sub>2</sub>(H<sub>2</sub>O)<sub>2</sub>, and MnO.

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