Contribution ID: **131** Type: **Talk**

Hybridized crystal field–phonon bound state in cerium-113 compounds

Tuesday, 8 December 2020 16:15 (25 minutes)

The coupling between elementary excitations in condensed matter can give rise to novel functional properties and exotic states, such as superconductivity, multiferroicity, or various types of polar order. We are particularly interested in the CeTAl3 (T is a transition metal), family of compounds, for which an unusual bound state was reported in CeCuAl3 and CeAuAl3. It arises due to the magnetoelastic coupling between the crystal field excitation (CEF) and phonons. Although it was observed in few other compounds, e.g. Tb2Ti2O7 [3] or PrNi2 [4], it was reported as an interaction of CEF and an optical phonon, while for CeAuAl3 we have observed an interaction of CEF and strongly dispersive acoustic phonon. This points to a different character of this phenomenon, and awaits a microscopic explanation. We are investigating this effect in other compounds, CePtAl3 and CePdAl3, and its connection with crystal structure and physical properties. In addition we want to determine the influence of the magnetoelastic coupling in Ce-113 compounds on their magnetic ordering and dynamics.
We have conducted various neutron diffraction and spectroscopy measurements on Ce-113 compounds. Our measurements show, that CePtAl3 exhibits a modulated antiferromagnetic ordering below TN=3.35 K, with a modulation vector q=(2/3 0 0), while CePdAl3 orders antiferromagnetically at TN=5.61 K. Magnetic properties, models of magnetic structure and first results on spin and lattice dynamics will be discussed.

Primary authors: STEKIEL, Michal (Technische Universität München); SCHNEIDEWIND, Astrid; ČERMÁK, Petr (MGML, Charles University); WEBER, Stefan (TUM); SCHOENENMANN, Rudolf; KUMAR, Vivek (TUM); FRANZ, Christian; PFLEIDERER, Christian

Presenter: STEKIEL, Michal (Technische Universität München)

Session Classification: MLZ Users 2020 - Structure Research

Track Classification: UM: Structure Research