Peculiar commensurate spin density wave in $CeAuSb_2$ under uniaxial stress

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In metallic heavy fermion materials, the magnetic ground state is often a spin density wave (SDW) phase in which the magnetization vary periodically with a period that is usually incommensurate with the parent structure lattice. These phases are associated to the itinerant character of the *f*-electron present in the system and are intimately related to the electronic structure near the fermi energy.

This is the case in the tetragonal heavy-fermion compound $CeAuSb_2$ which shows the development of a SDW phase below T_N~6.5 K with a propagation vector k_1 = (0.136, 0.136, 0.5) [1-2]. This phase is very sensitive to external stimuli and, indeed, the systems shows two metamagnetic phase transitions with magnetic field applied along the [001] direction [1-2]. An additional parameter which can tune the magnetic ground state is the application of a uniaxial stress, for example along the [010] direction. Extensive transport and thermodynamic measurements [2, 3, 4] indicate a sudden and anisotropic jump of the resistivity at an induced strain along the axis of compression of 0.5% indicating a first order transition.

In this talk we present single crystal time of flight neutron diffraction data collected under the application of a [010] uniaxial stress to characterize the magnetic phases of $CeAuSb_2$. The neutron data indicate a change of the propagation vector from k_1 at low stress to k_2 = (0, 0.25, 0.5) at high stress. Even with the geometrical constrains imposed from the experiment sample environment, which allows to collect only a limited number of magnetic reflections, we will show that it is possible to determine and refine the magnetic structure with the support of group theory calculations and magnetic symmetry analysis. The commensurate nature of the propagation vector is attributed to the presence of a lock in invariant in the free energy and we will show that the magnetic ground state under compressive stress is characterized by the presence of two primary order parameters related to different irreducible representations of the parent structure.

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