

Experimental report

02/02/2023

Proposal: 4-03-1743

Council: 4/2020

Title: Order parameter of the mysterious high field phase in Ce₃Pd₂₀Si₆

Research area: Physics

This proposal is a new proposal

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Samples: Ce₃Pd₂₀Si₆

Instrument	Requested days	Allocated days	From	To
THALES	9	5	19/02/2021	24/02/2021

Abstract:

Heavy-fermion metal Ce₃Pd₂₀Si₆ exhibits an antiferroquadrupolar phase and an antiferromagnetic phase. According to the phase diagram, the boundary between the PM and a hidden-order phase phase II, becomes strongly anisotropic in magnetic fields. We have previously identified phase II as a slightly incommensurate AFQ order by the appearance of field-induced magnetic satellites near the (111) Bragg peak. Despite the absence of magnetic Bragg scattering in phase II', its ordering vector was revealed later by the location of an intense magnetic mode. The question remains whether the phase II' exists only for fields applied along [001]. We did torque magnetometry measurement in a rotating magnetic field at the NHMFL. We discovered that the phase II' persists for almost all field directions. A new high-field phase transition for field directions close to [112] was also found. In this proposal we suggest to look for the order parameter as well as low-energy magnetic excitations as a function of the applied magnetic field along [112] using ThALES, which can give us valuable clues to understanding the nature of the recently found transition.

The data from this experiment have been already published. Please refer to our publication

F. Mazza et al., Phys. Rev. B **105**, 174429 (2022)

For the full account of the results of this beamtime.