Experimental report

09/04/2018

Proposal: 4-01-1329 **Council:** 4/2014

Title: Low-energy excitations in a new 2Dquantum phase

Research area: Physics

This proposal is a new proposal

Main proposer: Mechthild ENDERLE

Experimental team: Bjorn FAK

Local contacts: Wolfgang F SCHMIDT
Karin SCHMALZL

Samples: LiCuVO4

Instrument	Requested days	Allocated days	From	To
IN12	7	7	13/05/2015	20/05/2015

Abstract:

Spin-nematic quantum ground states are intensely studied theoretically.
LiCuVO4 is a quasi-onedimensional spin 1/2 ferromagnet with antiferromagnetic next-nearest neighbour interactions, and frustrated interchain interactions. It displays a high-field phase with short-range dipolar order in all reciprocal space directions, very anisotropic correlation lengths (70:700:3 spins in a-b-c direction) and a 2d-XY like heat capacity anomaly upon entering this phase. We suspect this phase to be of a new 2d-nematic type, not yet considered. We wish to test precise theoretical predictions for the low-energy spectrum of 2d-nematic (versus spin-density wave) phases, in particular the phason dispersion and intensity around k=kic and k=0 in the 2d-plane. We therefore ask for 7 days on IN12 equipped with 15T magnet and dilution insert.

Experimental report 4-01-1329

M Enderle

April 9, 2018

The experiment was allocated 7 days with 15 T magnet and dilution insert.
We started on may 13, where the reactor shut down in the afternoon for about 1h.
The first night was used for verifications at zero field.
In the following we encountered problems with the dilution (slowly blocking, the temperature increased up to 0.4 K).
He-filling required ramping the field down from 13 T to 3 T since there was no syphon of sufficient length to use IN12's magnetic lift for the 4He-vessel.
The signal being very low, we did not achieve sufficient statistics before the unscheduled reactor shutdown and end of cycle on may 17th. The experiment should have continued until may 21th.
The data are unpublishable. We would need to repeat the experiment.