

Experimental report

03/11/2019

Proposal: DIR-166

Council: 4/2018

Title: Hidden Correlations in a Quantum Liquid of Magnetic Octupoles

Research area: Physics

This proposal is a new proposal

Main proposer: Romain SIBILLE

Experimental team: Romain SIBILLE

Victor POREE

Sylvain PETIT

Elsa LHOTEL

Local contacts: Clemens RITTER

Thomas HANSEN

Samples: Ce₂Sn₂O₇

Instrument	Requested days	Allocated days	From	To
D20	3	3	25/06/2019	28/06/2019

Abstract:

Experiment: DIR-166

The experiment took place from the 25/06/2019 to the 28/06/2019. Once the sample was mounted on the dilution fridge, the cooling process was started to achieve the lowest temperature accessible, which was of 0.05 K. The first hours at low temperature were then used in order to track the thermalization of the large amount of sample placed in the can. The temperature was then increased up to 1.5 K (outside of the correlation regime) once again tracking the thermalization during the first hours. A total of 24 hours was measured at each temperature during which the sample was thermally stable. The high temperature data set was then subtracted to the low temperature one, thus extracting the diffuse scattering contribution. A careful treatment of the resulting signal was subsequently carried out so as to distinguish the diffuse signal from the lattice shifts (copper sample holder Bragg peaks). The output of this treatment can be seen in **figure 1**. As expected, the diffuse scattering intensity in reciprocal is shifted to high momentum transfer with a maximum around $7 \text{ \AA}^{-1}$. This is consistent with our understanding of the low temperature behavior of $\text{Ce}_2\text{Sn}_2\text{O}_7$ and strengthen its position as an octupolar Quantum Spin Ice candidate.

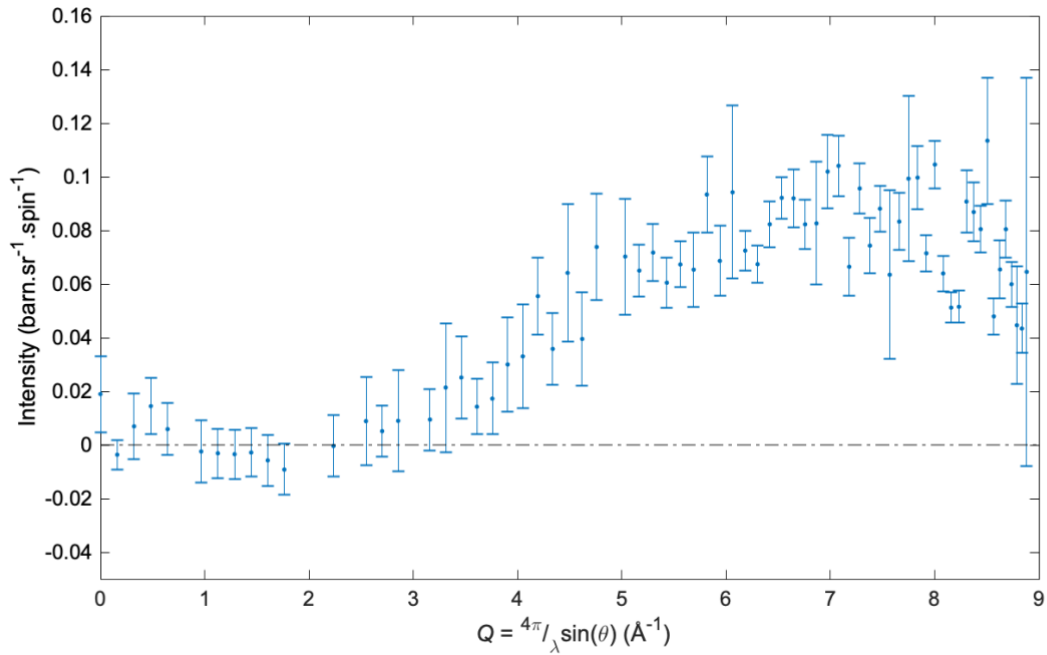


Figure 1: Diffuse signal measured on a $\text{Ce}_2\text{Sn}_2\text{O}_7$ powder sample with D20.