

Experimental report

16/02/2026

Proposal: 5-41-1226

Council: 4/2023

Title: Determining the magnetic structure of a novel cubic chiral insulator using polarized and unpolarized SANS

Research area: Physics

This proposal is a new proposal

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Samples: Co₅TeO₈ powder
Co₅TeO₈ single crystal

Instrument	Requested days	Allocated days	From	To
D33	4	6	01/12/2023	05/12/2023
			06/04/2024	08/04/2024

Abstract:

Insulating magnetic materials hosting topological magnetic textures like skyrmion lattices (SkL) are extremely scarce, yet those in the few known systems demonstrate outstanding features with promise for applications, such as manipulation by electric fields and solitonic dynamics in GHz range. Thus, from an application perspective, the discovery of emergent magnetic phases in new insulators is urgent for a full understanding and exploitation of the novel static and dynamic responses. In the present proposal we aim to study the long-period incommensurate magnetic structures we recently found in a new chiral magnet insulator Co₅TeO₈. The said system possesses a variety of distinct magnetic phases, some of which are likely topological in nature. Our preliminary SANS results suggest a intriguing field-induced transformation between a zero-field spiral order and a conical-type order, reminiscent of other skyrmion systems. In this proposal, we request 4 days at D33 for both polarised and unpolarised SANS measurements that will help us unambiguously determine the incommensurate magnetism in this exciting new insulator, and thus establish if topological SkL phases are awaiting discovery.

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Polarization-analysis experiment was performed at D33. We observed Bloch-type spiral state in Co_5TeO_8 . The resulting publication (including unpolarized SANS experiments at PSI) can be found at <https://arxiv.org/abs/2512.15147v1>.