

Experimental report

30/05/2024

Proposal: 5-51-597

Council: 4/2023

Title: Magnetic Form Factor Determination for Square-Planar Cu²⁺

Research area: Physics

This proposal is a new proposal

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Samples: Nd₂CuO₄

Instrument	Requested days	Allocated days	From	To
D9	4	4	19/06/2023	23/06/2023
D3 High field >1T	9	9	19/05/2023	26/05/2023
			22/06/2023	26/06/2023
D19	1	1	04/07/2023	05/07/2023

Abstract:

Refinement of the magnetic moments in complex oxide materials containing square planar Co²⁺ or Cu²⁺ cations appear to systematically over- or underestimate (respectively) the moment compared to the values predicted by theoretical calculations. We believe that this is due to the spherical approximation of the magnetic form factor not accounting well for the spatical distribution of the magnetic density in these materials. We would like to experimentally determine the magnetic spin density in Nd₂CuO₄ in order to compare with the predicted theoretical values.

Spin density measurements were carried out on a single crystal of Nd_2CuO_4 using the D3 diffractometer. Unpolarised neutron scattering data was collected from the same crystal using the D9 diffractometer. The experiment was successfully carried out as described in the proposal and the data is currently being analysed.