Contribution ID: **48** Type: **Poster Presentation**

Anomalous Magnetism in NiI_2: How Structure Affects Dynamics

NiI_2 is a layered van der Waals magnet which has recently been proposed to host a novel form of skyrmion phase in the 2D limit[1]. μSR has proven to be a sensitive probe of magnetic dynamics resulting from such topological excitations. I will present the results[2] of μSR measurements of NiI_2, which probe magnetic phase transitions at $T_{N1} = 73$ K and $T_{N2} = 62$ K. Supporting density functional theory calculations will be discussed which allow the determination of a muon stopping site whose magnetic environment is consistent with the proposed ground-state magnetic structure. Measurements of dynamics reveal behavior consistent with spin-wave excitations below T_{N2}. In the region $T_{N2}<T<T_{N1}$ the character of the dynamics changes qualitatively, resulting in an unusual region of temperature-independent fluctuations. Our measurements, combined with a group theoretical analysis of the Ni electron orbitals, show that the changes in magnetic behavior between these two temperature regions are possibly caused by a subtle shift in the material's structural symmetry at T_{N2}. This work demonstrates how a combination of techniques in support of μSR measurements can lead to greater insight into the results of experiments and our conclusions shed new light on the driving forces behind the rich magnetism hosted by this material.

[1] D. Amoroso et al. Nat. Comm. 11, 5784 (2020)
[2] T. L. Breeze et al. PRB 111, 104420 (2025)

Email

theodore.l.breeze@durham.ac.uk

Funding Agency

EPSRC

Supervisors Name

Tom Lancaster

Supervisors Email

tom.lancaster@durham.ac.uk

Did you request an Invitation Letter for a Visitors Visa Application

No

Primary author: BREEZE, Theo (Durham University)

Co-authors: Dr HERNANDEZ-MELIAN, Alberto (University of Southampton); Dr HUDDART, Benjamin (University of Oxford); Dr MAYOH, Daniel (University of Warwick); PRATT, Francis (ISIS); Prof. BALAKRISHNAN, Geetha (University of Warwick); Dr WOOD, George (ISIS); Dr WILKINSON, John (ISIS); BENTLEY, Nathan (University of Durham); Prof. CLARK, Stewart (Durham University); HICKEN, Thomas (Paul Scherrer Institute); LANCASTER, Tom (Durham University)

Presenter: BREEZE, Theo (Durham University)

Session Classification: Poster Session 1

Track Classification: Magnetism