

MONDAY

COLLOQUIUM

Unconventional Magnetic Textures: Exploring Beyond Traditional Magnetism at Interfaces by Hall-Marking techniques

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5 May 2025 (Monday) | 16:00 Hrs (Tea / Coffee 15:45 Hrs) | Venue: TIFRH Auditorium

From the compass needle's mystique to the digital revolution, magnetic materials have captivated scientific minds for their fundamental physics and transformative technological applications. This talk will embark on a journey through this rich history, using magnetic data storage as a compelling thread to connect pivotal challenges and ingenious solutions that propelled progress to our current era. Today, the focus has shifted towards harnessing the exotic physics of unconventional magnetic textures for next-generation electronics. A key frontier in this endeavour lies in unveiling hidden magnetic order at interfaces, where non-coplanar textures with their topologically non-trivial states and low-energy excitations promise groundbreaking functionalities. I will demonstrate how exquisitely sensitive electron transport measurements serve as a powerful lens to probe the emergence and properties of these textures in two distinct interfacial systems: (i) the intriguing proximity-coupled heterostructure of a ferromagnetic insulator (EuS) and a topological insulator ($\text{Bi}_2(\text{Se,Te})_3$), and (ii) meticulously grown ultra-thin films of Cr_2Te_3 exhibiting tailored magnetic competition. Furthermore, I will reveal how our transport studies provide insights into the anisotropy of these fascinating magnetic states. Finally, I will outline our ongoing research exploring the fundamental topological physics and potential for emergent superconductivity in these systems, highlighting their exciting prospects for future technological innovation.