17 Dec **Friday** **12:45 – 1:30** **Chair: ARIANDO**

Creating and Manipulating Magnetic Skyrmions

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Professor SOUMYANARAYANAN, Anjan is an Assistant Professor of Physics at the National University of Singapore (NUS), and a Senior Scientist at the Agency for Science, Technology & Research (A*STAR).

Anjan's research interests are in topological and quantum phenomena at material surfaces and interfaces. He leads a cross-institutional team on Spin Technology for Electronic Devices (SpEED), which develops thin film materials and devices and investigates their properties using microscopic, spectroscopic, and transport techniques. His recent work has focussed on spin-orbitronics – including magnetic skyrmions and topological materials.

Anjan obtained his B.A. in Natural Sciences in 2005 from Cambridge University, UK, and PhD in Physics in 2013 from MIT, USA. He received the 2018 IEEE Magnetics Society Early Career Award and the 2018 Singapore Young Scientist Award for his work on skyrmions.

Abstract:

Magnetic skyrmions are topological spin structures emerging from the interplay of atomic-scale magnetic interactions. Their room temperature stability and tunability in multilayer films has spawned a fascinating research field witnessing rapid progress in fundamental science and device applications [1]. Practical technologies require nanoscale skyrmions stable under ambient conditions, along with electrical manipulation and detection capabilities within device configurations.

We begin by establishing a multilayer platform where skyrmion properties (e.g., size, density) can be smoothly tuned by modulating interfacial chiral interactions [2]. We further show that these interactions gradually induce transitions in key microscopic skyrmion characteristics and formation mechanism [3]. Next, we present a distinct thermodynamic marker associated with ZF skyrmion stability in films and nanostructures [4, 5].

We conclude with efforts to electrically write, delete, and move skyrmions in nanowire devices [6, 7].

References
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