

MONASH CENTRE FOR ELECTRON MICROSCOPY

Imaging magnetic skyrmions using electron microscopy

Date: Tuesday January 14, 2025

Time: 11:30am – 12.00pm

Venue: S1, 16 Rainforest Walk, Clayton Campus

Abstract

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Skyrmions are topological spin structures where small domains of reversed magnetic field can exist stably in some magnetic materials. Their properties depend on the size and shape of the magnetic domains and on the magnetic structure of the domain wall enclosing the skyrmion. Although magnetic fields do not produce contrast directly in a transmission electron microscope, a number of methods can be used to make them visible.

In differential phase contrast scanning transmission electron microscopy (DPC STEM) a focused electron beam passes through the sample deflecting the beam in proportion to the in-plane component of the magnetic field. To form an image the beam is scanned across the sample and the beam deflection measured at every point.

With electron holography it is possible to image magnetic fields by using an electron biprism to interfere the electron wave passing through the specimen with a reference wave passing around the specimen edge. This requires a coherent electron beam and an electron biprism.

I will talk about how both these techniques can be used to image skyrmions in Ir-Fe-Co-Pt and similar thin films.

Biography

Chris Boothroyd is a Senior Principal Research Fellow at the Facility for analysis characterisation testing and simulation (FACTS), Nanyang Technological University, Singapore. In the past he worked in the Department of Materials Science and Metallurgy, University of Cambridge, at IMRE, Singapore, at the Center for Electron Nanoscopy, Technical University of Denmark and at the Jülich research centre (Forschungszentrum Jülich) in Germany. His research interests cover a wide variety of topics related to electron microscopy including aberration-corrected microscopy, energy-loss spectroscopy and electron holography.

Convenor: Professor Laure Bourgeois

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