



Abstract ID : 113

Exploring magnetic correlation lengths in frustrated systems via single-crystal neutron diffraction

Content

Magnetic systems with frustrated interactions—where competing interactions cannot be simultaneously satisfied—often exhibit “fragile” ground states that are highly sensitive to even weak perturbations. In such systems, magnetic order is frequently incomplete and characterized by a limited correlation length, appearing in neutron diffraction experiments as diffuse scattering. In this presentation, I will discuss the properties of several families of rare-earth-based magnetically frustrated compounds in which we observed a pronounced diffuse scattering component during single-crystal neutron diffraction experiments using both polarized and unpolarized neutrons. Particular emphasis will be placed on the behaviour of these materials under applied magnetic fields, which in some cases induce long-range order, in others suppress it, and in certain instances even lead to the coexistence of both ordered and disordered states.

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Contribution Type: Invited

Submitted by FISCHER, Henry on Monday, December 8, 2025