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# Using SANS to explore multi-Q magnetic phases in quantum materials

In quantum materials, interactions between unpaired electrons can lead to the formation of complex magnetization textures, that themselves generate novel quantum effects ripe for exploitation in applications. When the periodicity of these textures are incommensurate with the host crystal lattice, SANS can play the key role in both their observation, and the efficient characterization of their phase diagram as function of various thermodynamic parameters. Of particular interest are magnetization textures that modulate along more than one direction simultaneously, the so-called multi-Q structures. In the last decade, multi-Q structures have been shown to possess novel topological properties. Consequently, SANS continues to be an indispensable tool in the search for new multi-Q phases in a variety of systems. Here, I will highlight our recent work in this area done using the SANS instruments at the ILL, in particular at the hard matter SANS beamline D33. This beamline combines the high flux of the ILL, with flexible sample environment and beam polarization analysis options to make this instrument a most attractive choice for this research area.

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