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Recent polarised neutron experiments at ACNS

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In this presentation, several recent experiments using polarised neutrons at ACNS will be described. One experiment used polarisation analysis on the cold triple-axis spectrometer Sika to complement a previous unpolarised measurement of a polyelectrolyte sample on the backscattering spectrometer Emu in the quasi-elastic neutron scattering (QENS) regime. This allowed the Kohlrausch-Williams-Watt stretched exponential function describing polymer relaxation in the dynamic structure factor of the sample, which we identified as the incoherent scattering component, to be unambiguously separated from the remaining coherent scattering contribution. This study also compared the relative performance of a diffraction-mode measurement which integrates over all energies to an elastic-mode measurement which accepted a much narrower neutron energy range at the detector, to determine which approach would yield better results.

Another experiment required a strong magnetic field to be applied in the scattering plane for a polarised study of a chiral magnet structure on the thermal triple-axis spectrometer Taipan. This presented several technical challenges in terms of both designing a device to apply such a field over the necessary range of scattering angles, as well as preventing the polarised ^{3}He spin filters from being depolarised by stray magnetic fields on a time scale too short to perform a measurement. The successful implementation of this setup enabled the reversal of magnon spin currents at a critical temperature in a ferrimagnetic terbium garnet to be observed, which can be understood as a manifestation of the spin-Seebeck effect.

Topics

Magnetism and Condensed Matter

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