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Linear Spin Wave Theory and TOF spectrometry: the perfect match

Inelastic neutron scattering has long been the tool of choice for the study of spin waves and magnons, with the first reports stemming from the seminal work of Brockhouse. In the intervening decades time-of-flight spectrometers have become the tool of choice for the study of complex magnetic materials due to the large volume of reciprocal space investigated. While in more recent times the measurement of spin waves in powders has become possible due to the implementation of large position sensitive detectors, which allow for much more detailed spectra to be determined. Until recently, obtaining the spectra was much more straightforward than modelling it – resulting in a bottleneck for data analysis. However the implementation of codes for spin wave theory [1,2] has meant that this is now fairly straightforward even for complicated cases such as low symmetry structures, incommensurate magnetic structures and powder samples. In this contribution we will summarise some recent successes from work performed at ANSTO in this field such as the use of powder averaging and the study of quantum spins.

[1] S. Toth, B. Lake J. Phys. Cond. Mat, 27, 2015, 166002
[2] http://www-llb.cea.fr/logicielsllb/SpinWave/SW.html

Topic

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