

Practical: Spin waves

Sylvain Petit

LLB, CE-Saclay, F-91190 Gif sur Yvette cedex

sylvain.petit@cea.fr

Abstract. Developed in the 1950's [1-5], spin wave theory has been a milestone of magnetism, still of fundamental importance in condensed matter physics to date. Although it is well acknowledged nowadays that it has strong limitations - a number of magnets actually never order, owing to strong quantum fluctuations, low dimensionality or frustration effects - this approach allows a simple treatment of magnetic collective excitations around a mean field long range magnetic order. Using the *SpinWave* software, a general code developed at LLB [6] and able to deal with any magnetic structure, the aim of this practical is to simulate the spin waves spectra in simple cases. The results will be discussed in connection with lectures on magnetic structures, neutron scattering spectroscopy and the general introduction to magnetism in solid state physics.

References

[1] P.W. Anderson, *Phys. Rev.* **83**, 1260 (1951).

[2] R. Kubo, *Phys. Rev.* **87**, 568 (1952).

[3] T. Oguchi, *Phys. Rev* **117**, 117 (1960).

[4] C. Tsallis, *J. Math. Phys*, **19**, 277 (1978).

[5] D.C. Wallace, *PR*, **128**, 1614 (1962).

[6] S. Petit, Numerical simulation and magnetism, *Collection SFN*, **12**, 105 (2011).