

Introduction to X-ray and neutron scattering

Des McMorrow

London Centre for Nanotechnology, UCL

An introductory overview will be given of X-ray and neutron magnetic scattering. Both techniques are established as being indispensable in providing unique insight into the nature of magnetic correlations on all relevant length and energy scales. The weak scattering limit of both techniques (in contrast to the case of electrons, for example) also enables direct comparison with theory. While traditionally these techniques have been largely viewed as being complementary to one another, recent advances in X-ray methods means that there is much more direct competition.

Emphasis will be placed on the scattering cross-section, with outline derivations presented following the identification of the relevant interaction Hamiltonians for the particular scattering process under consideration. Recent developments in resonant X-ray scattering (elastic and inelastic) will be highlighted. The intention is to equip the student with enough insight to enable him or her to make an informed choice of the best technique for the particular problems of interest.