NRC·CNRC
INFORMATION

Neutron Program for Materials Research

Magnetism

Magnetic Structures
Spin Waves
Local Correlations

The application of neutron scattering techniques to the study of condensed matter has resulted in immense gains in our understanding of cooperative phenomena. Magnetic materials, by virtue of their relative simplicity and the short-range nature of magnetic interactions, have served as prototypical cooperative systems.

The magnetism and superconductivity program provides users with a variety of environments (see list below) in which their sample can be mounted while performing elastic and/or inelastic neutron scattering measurements. The range of wavelength and energy possessed by thermally moderated neutrons allows us to study not only the nuclear long-range, static, nature of solids but also the dynamics (phonons). Similarly, the neutron's magnetic moment (S=1/2) allows it to couple well to the magnetism in solids, allowing unparalleled scrutiny of both the magnetic structure (short- and long-range) and the excitations (magnons) of magnetic materials. Neutron scattering techniques are presently considered as the most powerful probe of magnetic materials.

The 7 Tesla vertical and 2.5T horizontal field magnets. Both pieces of equipment can be mounted on our triple axis spectrometers.

The field of magnetism and superconductivity has not only produced some of the most exciting pieces of neutron scattering work, (determination of antiferromagnetic structures (Shull and Wollan), spin dynamics in High Tc (Rossat-Mignod), etc.) but it has also advanced the development of neutron scattering techniques, such as the triple axis spectrometer (Brockhouse), polarisation analysis (Moon, Riste and Koehler) and Neutron Spin Echo (Mezei). At the NRU, the magnetism program utilises the two triple axis spectrometers (N5 and C5) and the high resolution diffractometer (C2). C5 has the capability of performing polarised experiments and with its velocity selector we have a tunable filter for neutrons between 2.37 and 4Å.

Current ancillary equipment allows us to apply magnetic fields up to 2.5T in the scattering plane and 7T perpendicular to the plane. We can reach 1.8 K in the horizontal field magnet and our bath cryostat and we have several closed cycle refrigerators.

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