

SEMINAR

The Role of Neutron Scattering Research in Materials Characterization

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11am – 12noon
Science Lecture Theatre S11, Building 25

Abstract

Neutron scattering techniques have evolved over more than ½ a century into a powerful set of tools for determination of atomic and molecular structures. Modern neutron beam facilities offer the possibility to determine complex structures over length scales from ~0.1 nm to ~500 nm. They also provide information on atomic and molecular dynamics, on magnetic interactions and on the location and behaviour of light elements (such as hydrogen) in a variety of materials. As a consequence research applications are many and varied, and generally complement electron and X-ray beam methods and optical spectroscopy. Modern neutron beam applications in the hard matter sciences include studies of magnetic and superconducting materials, hydrogen storage, lithium batteries, ferroelectrics, ceramics and glasses. Applications in the soft matter sciences include polymers, micelles, surfactants and biological systems. Real time studies of 'non-equilibrium' systems are also common, as are studies of surfaces and interfaces.

The OPAL nuclear reactor, at Lucas Heights, is a 20 MW pool-type research reactor, using low enriched uranium fuel and cooled by water. OPAL is used for scientific research using neutron beams, radioisotope production (particularly for radiopharmaceuticals) and industrial irradiation services. The neutron beam facility has been designed to compete with the best beam facilities in the world. After seven years in construction, the reactor and neutron beam facilities were commissioned in 2007. OPAL now has seven first rate spectrometers in operation, with six more under construction, including one neutron radiography/tomography instrument. Possibilities for future expansion of the facility include positron beam lines for positron annihilation spectroscopies and microscopy.

The presentation will include an outline of the strengths of neutron scattering and a description of the OPAL research reactor, with particular emphasis on its scientific infrastructure. It will also provide some recent scientific highlights with an overview of the opportunities for research that are possible at OPAL, and mechanisms for accessing these exciting new facilities.



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Visitors are most welcome: Please note that there is a designated Visitors Car Park (S2) clearly ground-marked by white paint and tickets, at a cost of \$3.5/hour for up to 3 hours, available from a dispensing machine. This high-rise car park is located on the following Clayton Campus Map, Ref. E3.

[Printable version of the Clayton campus map \(pdf 833 kb\)](#) (Please right click to open link)