Federal Budget 2009 Background

Neutron Beam Research

Neutron beam research utilises neutrons produced by the OPAL nuclear reactor by scattering them in techniques used to find answers to fundamental questions about the structure and composition of materials used in medicine, mining, transportation, building, engineering, food processing and scientific research.

Neutrons are subatomic particles released in nuclear fission. They have no electrical charge and penetrate materials more effectively than X-rays. This ability makes neutrons an especially useful tool in industrial materials analysis.

Neutrons penetrate most materials to depths of several centimetres. In comparison, X-rays and electrons probe only near the surface.

The three neutron beam instruments will be a second small-angle neutron scattering instrument, a spectrometer with very high resolution, and a neutron radiography station. The small-angle scattering instrument is capable of studying the nanoscale structure of important materials, for instance almost anything in the kitchen or garage. The high-resolution spectrometer can then study how the molecules move and diffuse in the same "soft" materials, including biological molecules. The radiography station will enable us to see hydrogenous materials like water, oil or explosives inside metals, ceramics or rocks. This has broad application to oil and gas extraction, the explosives industry and important new technologies like fuel cells for the hydrogen economy.

A split in the current cold neutron guide which sends neutrons to instruments from the core of the OPAL reactor, is included in the funding.

Centre for Accelerator Science

Australian researchers (from all 37 Australian universities, plus other agencies such as CSIRO, the Department of the Environment, Water, Heritage and the Arts, state and local government bodies, and overseas collaborators and customers) use ANSTO's accelerator facilities to measure, very accurately, minute amounts of a particular substance in a much larger volume.

Such measurements are essential to carry out studies in: climate and environmental science; nuclear safeguards and forensics; materials science; medical physics; and radiation physics.

Accelerator-based science is more important than ever to the study of the challenges of climate change and particle pollution, and to nuclear non-proliferation.

These accelerator facilities are part of Australia's national research infrastructure. One of the two accelerators used for that purpose, the ANTARES Accelerator, is nearly 40 years old and it is increasingly more maintenance-intensive and expensive to operate.

This project includes a compact, low energy multi-isotope AMS accelerator facility with multiple ion sources and ion source test bench facility which would be primarily used for radiocarbon dating and heavy isotope analysis, including nuclear safeguards work. A second accelerator (a modern low-maintenance 5MV accelerator) would be acquired to replace the ANTARES accelerator – the primary use of which would be in measuring isotopes of interest for the study of climate change.

The projects will commence immediately and it is anticipated these will be complete by 2013.

For more information please contact Sharon Kelly, Media and Community Relations Manager on (02) 9717 9575 or 0400 394 085

* Australian Nuclear Science and Technology Organisation – Australia's centre for nuclear science and research