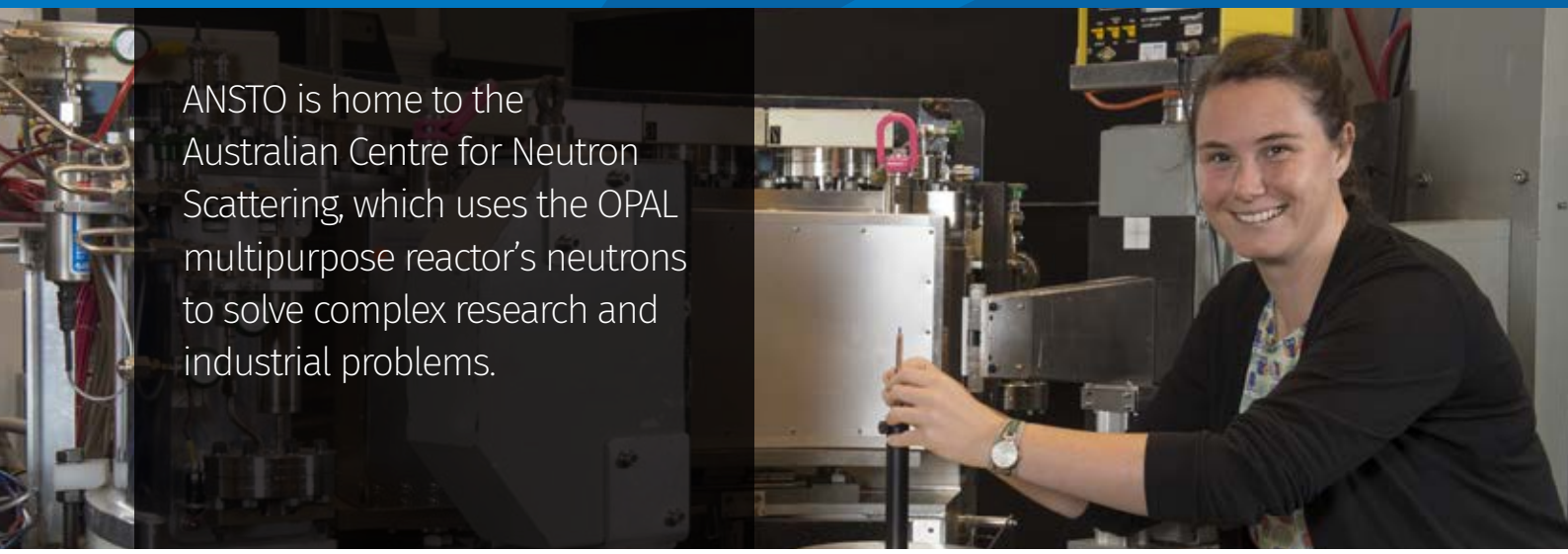
Australian Government

ANSTO

Australian Centre for Neutron Scattering (ACNS)



ANSTO is home to the Australian Centre for Neutron Scattering, which uses the OPAL multipurpose reactor's neutrons to solve complex research and industrial problems.

Helen Maynard-Casely mounting a sample on the Wombat powder diffractometer.

At ACNS neutrons are used to determine the internal structure and dynamics of materials, helping scientists understand why materials have the properties they do, and helping tailor new materials, devices and systems.

Applications

Characterising new battery materials with greater storage capacity and discharge capabilities, essential to improving energy efficiency and security

Studying the structural integrity of materials such as critical welds in pipes used to transport energy resources around Australia, enhancing energy security

Improving scientific understanding of the growing problem of food allergies through the observation of interactions between biological molecules such as proteins, viruses and cell membranes

Determining the structure and dynamics of materials used hydrogen fuel systems enabling more efficient and effective clean energy systems

Facilities

Diffractometers

Echidna
High-resolution powder diffractometer

Wombat
High-intensity powder diffractometer

Koala
Single-crystal Laue diffractometer

Kowari
Strain scanner

Joey
Crystal-alignment Laue diffractometer

Quokka
Small-angle neutron scattering instrument

Bilby
Time-of-flight small-angle neutron scattering instrument

Kookaburra
Ultra-small-angle neutron scattering instrument

Imaging and Reflectometry

Dingo
Radiography / tomography / imaging station

Platypus
Neutron reflectometer

Spatz
Neutron reflectometer (under construction)

Inelastic Spectrometers

Taipan
Thermal-neutron three-axis spectrometer (with Beryllium filter option)

Sika
Cold-neutron three-axis spectrometer

Pelican
Cold-neutron time-of-flight spectrometer

Emu
High-resolution back-scattering spectrometer

Every year hundreds of scientists from Australia and the world access facilities at ACNS

Access

Access to ACNS is available via the ANSTO User Portal at
www.ansto.gov.au/useraccess

Partially funded by
NCRIS
National Research Infrastructure for Australia
An Australian Government Initiative

Vanessa Peterson loading samples on the Echidna powder diffractometer.

Neutron beam instrument case studies

Combating influenza

Tens of thousands of Australian's suffer from influenza (flu) every year with many cases serious enough to result in hospitalisation. The development of new devices for its rapid diagnosis and treatment are essential to reducing its duration and severity.

ANSTO scientists, collaborating with the University of Newcastle upon Tyne and Orla Protein Technologies Ltd in the United Kingdom, are using neutron reflectometry to aid the design and manufacture of new molecular-based devices. These provide rapid electronic read-outs with results that are less influenced by patient variability compared to existing devices.

Improving power turbine blades

The structural integrity of turbine blades used in power stations is being examined by neutron imaging and strain analysis by ANSTO scientists and their research partners.

Neutron techniques are providing information about stresses that may be critical for failure analysis of turbines, bridges, pipes and aircraft engines. Such information ensures the safety of people using these components, enables companies to maximise the efficiency of their assets, and informs the choice of materials and processes in future manufacturing regimes.

Helping prevent bowel cancer

Working with Perten Instruments, Australian researchers developed a new technique to examine food manufacturing processes in real situations and real time. The neutron Rapid Visco Analyser allows manufacturers to determine the best way to cook and process the starches present in foods such as rice, pasta and cereals.

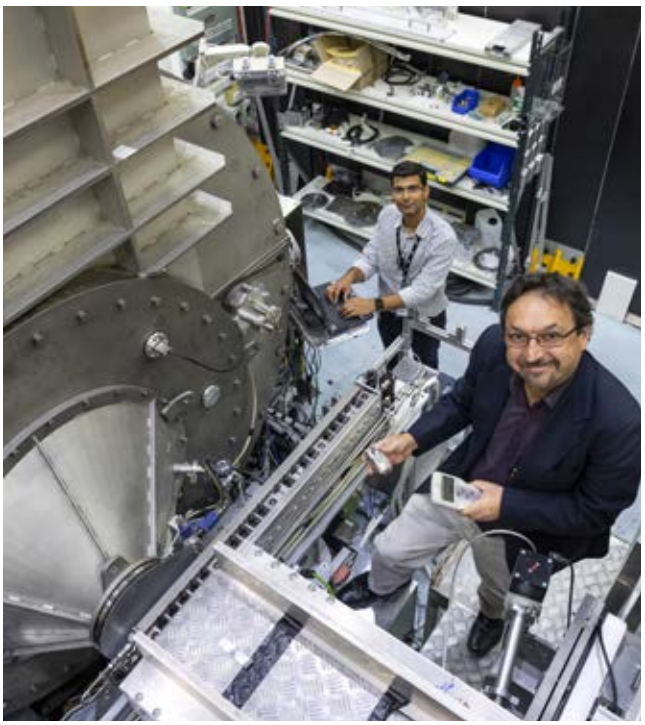
This discovery could mean manufacturers will be able to make food more efficiently, with lower energy input. It also gives manufacturers the ability to create starches with known health benefits, similar to those that have been proven to help counter bowel cancer.

Keeping our railways safe

Australia's rail industry is benefiting from nuclear techniques, which are used to solve the problem of fatigue (squats) or cracks in rails. While typically starting as minor abnormalities, rail squats can quickly turn into dangerous vertical cracks.

The facilities at ANSTO allow researchers to examine full-scale components. The study is helping railway engineers better understand how residual stresses evolve, and then develop rails with longer service lives, and determine the most appropriate rail maintenance schedules for safe and economic operation.

Ania Paradowska aligning a sample on the Kowari strain scanner.



Jitendra Mata (left) and Elliot Gilbert loading samples on the Quokka SANS instrument.

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