

OPAL news

The OPAL Reactor ran very well during the first quarter of 2010, with an overall reliability of 93% with respect to the previously published schedule. Our 4 thermal-neutron diffractometers all used in excess of 85% of this beam time for user experiments. As for the cold instruments, QUOKKA has now run its first user experiments (see below) and has submitted its first paper for publication. However, on 14th March, the second of the two primary compressors for our cold-neutron source failed, and it has not operated since then. The estimated date for return to service for QUOKKA and PLATYPUS is 8 May 2010. The thermal-neutron instruments have continued to run throughout.

Bragg Institute News

In February, the Institute underwent a full external review, by an international committee chaired by Prof. Peter Colman (Walter and Eliza Hall Institute). This came out very well, with a summary statement that: *"The Institute has laid an excellent foundation (in staff, instruments, planning processes and advisory networks) to become an internationally competitive neutron scattering facility. We commend all involved in this achievement."* The review also made a series of formal recommendations that ANSTO and the Institute are now considering in detail.

In early March the NBI-2 Project team moved into a new temporary project-office building adjacent the Neutron Guide Hall. The new building will accommodate up to 25 staff including the whole Major Capital Projects team, instrument scientists, engineers, designers, admin and procurement staff, in one common location.



NBI-2 Project Home – Building Hut 77

And on the 14th April, the Steering Committee for the NBI-2 Project approved the scope, budget and estimated schedule for the third of the five key elements in the \$37M Neutron

Beam Expansion Project announced in the Australian Government's May 12th 2009 Budget Statement: the [BILBY Time-of-Flight Small-Angle Neutron Scattering Instrument](#). The BILBY project is led by Anna Sokolova.

Around the instruments

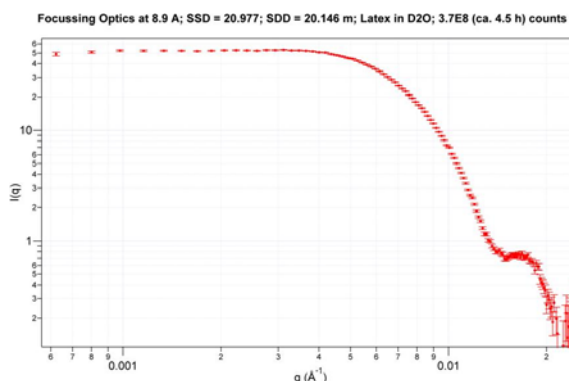
Quokka (SANS)



Instrument scientist Elliot Gilbert with I-Ting Liu, Po-Wei Yang and Tsang-Lang Lin from the National Tsing-Hua University.

The first peer-reviewed user experiment on QUOKKA was completed in March by the group of Professor Tsang-Lang Lin from the National Tsing-Hua University in Taiwan. Their experiment investigating multi-lamellar lipid-DNA complexes was evidently successful, as can be seen from their group photo above.

We have also recently successfully commissioned the first stage of focussing optics. QUOKKA is now able to reach a minimum q of about 0.0006 \AA^{-1} , using a wavelength of 8.9 \AA , by focussing the neutron beam on the detector at a distance of 20.9 m from the sample using an array of 24 MgF_2 lenses. This minimum q is below the design requirement and additional experiments are planned to reduce this further.



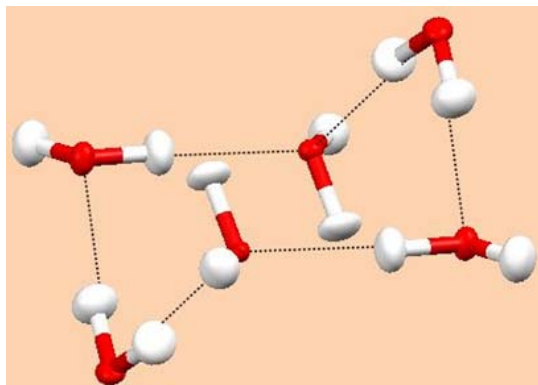
Data collected from a latex sample in D₂O using the QUOKKA focussing optics.

The first deuterated protein produced by the National Deuteration Facility has also been investigated on QUOKKA, while Katy Wood and James Cornwell, an honours student at the University of New South Wales, have commissioned a new stopped-flow sample environment.

Koala (*Laue Diffractometer*)

KOALA images can now be processed via a scripted interface which allows users to undertake data-reduction in a streamlined manner for small unit cells. Recent users have had considerable success in refining models for structures with primitive cell edges of the order of 15 Å or less.

Studies of intracrystalline water cluster geometries within pharmaceutical materials form the focus of a post-doctoral project being undertaken by Katharina Fucke in the laboratories of Jon Steed and Judith Howard, University of Durham, UK. In April, Katharina resolved the image below of three water molecules per molecule of a pharmaceutical material which forms six-membered rings analogous to those in ice. The extended hydrogen bonding connects each cluster to neighbouring molecules of the pharmaceutical, the rings thus being isolated from each other.



Intracrystalline water clusters within a single-crystal pharmaceutical material.

Software is under development to improve data reduction procedures for larger unit cells. Where these are of interest, potential users should discuss their projects with the instrument scientists to ascertain whether data of suitable quality for the desired purpose may be obtained – for example - we have extracted data for a potential catalyst material from the laboratory of Michael Gardiner, University of Tasmania, from which the presence of an hydridic hydrogen

atom is clearly demonstrated. In this case the data reduction was compromised by a larger cell dimension, but nonetheless, the resolution was sufficient to determine the hydridic nature of the material.

In the Press: A Laue diffraction image taken using our KOALA single-crystal diffractometer has been used in the new textbook **Essential College Physics, Vol. 2**, published by Addison Wesley. The book is written by Profs. Andrew Rex (University of Puget Sound) and Richard Wolfson (Middlebury College). The image, featuring sodium chloride, was taken in 2008 as the first image taken on KOALA, during commissioning. It appears in Chapter 23.4, on page 544, under the heading "Evidence for Matter Waves".



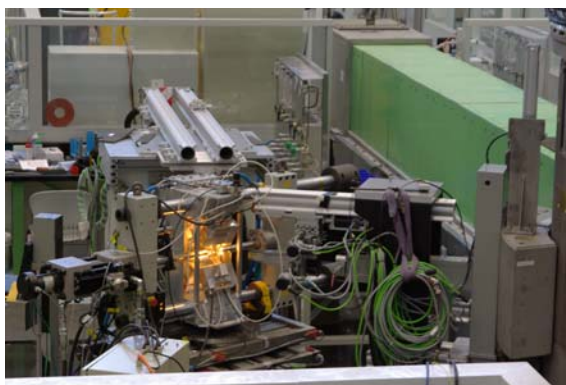
Sika (*cold three-axis spectrometer*)

February heralded the arrival of major components for SIKA. Upon delivery, these parts were transported into the Reactor Hall where they are awaiting imminent installation.

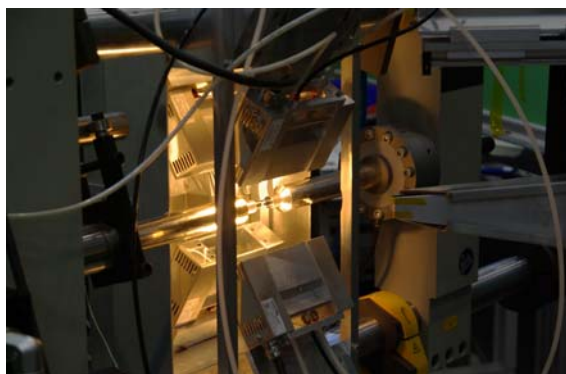


Kowari (strain scanner)

For the first time, our 100 kN load frame and furnace were used simultaneously on KOWARI. Between 19 and 22 April, Nicole Stanford from Deakin University used the setup to study *in situ* hot deformation of magnesium-based alloys, with the aim of identifying the mechanisms of texture modification. This should guide future alloy design toward higher-ductility alloys that can be readily formed into useful shapes.



The 100 kN load frame with the furnace attachment mounted on Kowari's sample table.



The samples were heated to 300 °C during the tests carried out in load control to compensate for thermal expansion. During the actual experiment the furnace was sealed and filled with nitrogen.

This experiment would have been impossible without the significant efforts of the Sample Environment and Computing groups, for which the instrument scientists and users are most grateful. Thanks guys!

Visit by Professor Andreas Magerl

Having recently completed his term as Head of Physics at the University of Erlangen-Nürnberg, Prof. Andreas Magerl recently spent 2 months of his sabbatical at the Bragg Institute.

Andreas has long standing experience in the construction of innovative [neutron- and X-ray scattering instrumentation](#).

During his time here, Andreas provided valuable advice on the design specifications for EMU, the sub- μeV back-scattering spectrometer to be constructed under the NBI-2 Project. He also formulated future projects, following meetings with the Institute's scientists.

Andreas will return to ANSTO in October to investigate structural issues of flowing liquids using the PLATYPUS reflectometer.



Prof. Magerl with former PhD student and ANSTO Senior Research Fellow Klaus-Dieter Liss.

Announcements

5th call for proposals – deadline 30 May 2010

The 2010-2 Round call for proposals for instrument time between Oct 2010 to Mar 2011 is for all 7 initial neutron-beam instruments (powder diffraction, SANS, reflectometry, strain scanning, single-crystal diffraction, triple-axis) and the National Deuteration Facility (bio- and chemical deuteration).

Proposals for neutron-beam instruments and the National Deuteration Facility should be submitted via our online proposal system <https://neutron.ansto.gov.au> by **May 30**.

Proposals will be reviewed in May/June and the Programme Advisory Committee will meet to assess these proposals in July 2010.

Neutrons and Food Workshop, Nov. 2010

The Institute has been successful in gaining \$24k of external funding from the Department of Innovation, Industry, Science and Research, under its International Science Linkages Program, for a workshop "Neutrons and Food: Addressing the challenges of food science in an evolving global environment using novel methods". The workshop will run 31 October – 3 November 2010 in Sydney, in partnership with the European Union's NMI-3 *Integrated Infrastructure Initiative for Neutron Scattering and Muon Spectroscopy*, which has also provided funding support. We expect 70-80 attendees from Australia and around the world.

For more details, please contact Elliot Gilbert Elliot.Gilbert@ansto.gov.au.

ANSTO Bus Service Trial Extended

Books of 10 bus tickets for the Sutherland-ANSTO bus service are now available at a discounted price of \$30 from the Bragg Institute User Office, AINSE and the ANSTO Cafe. Tickets are valid for use on all services to and from Sutherland Railway Station, from 07:50 to 18:30 (from Sutherland) and 09:00 to 19:00 (from ANSTO). Click [here](#) for the new timetable.

Faces

Newcomers:



Dr Stephen Holt recently joined our time-of-flight neutron reflectometer ([PLATYPUS](#)) team, having acted in an equivalent role at the [ISIS](#) spallation source in the UK

Dr Nicholas de Souza has joined us from the [Juelich Centre for Neutron Science](#) at the [FRM-II Reactor](#) in Munich, to lead our effort for [EMU](#) a high-resolution (1 μ eV) back scattering spectrometer at OPAL.



Dr Phil Bentley has joined our team, as part of the \$37M NBI-2 Neutron Beam Expansion Project. Phil joins us from the [Institut Laue Langevin](#) in Grenoble, France.



Kate Piccirillo is a trainee administrative assistant within the User Office and NBI-2 Project. Kate recently completed her HSC studies at Oak Flats High School.

Craig Hughes, Jason Christoforidis, Trevor Randall and Andrew Eltobaji joined the Bragg Institute NBI-2 Project from Campus Services and David Howes from ANSTO Procurement.

Departures:



Tracey Hanley spent 5 years with the Bragg Institute as the X-ray instrument scientist. In this role she managed the purchase, installation and operation of the X-ray instruments located within the Bragg Institute Neutron Guide Hall. Tracey is now with the ANSTO Institute of Materials Engineering, leading their Separation Science program.

Annemieke Mulders, Bragg Research Fellow at Curtin University of Technology, has accepted a faculty position with the University of New South Wales at the Australian Defence Force Academy. Annemieke commenced her Bragg Research Fellowship, at the Department of Imaging and Applied Physics in May 2006. We wish her well in her new position and hope to see her regularly!



Contact us

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