Bragg Peaks
> for neutron users
ISSUE 10 | APR 09

OPAL news

Since the last Bragg Peaks in January 2009, OPAL and its cold source have both run well, and many users have come through to do experiments. The present cycle (#13) started on 2nd April 2009 and will continue until 29th April. Upcoming operating cycles are: 2 May – 2 June, 12 June – 7 July, and 12 July – 13 August 2009.

The main reactor issue affecting our users remains that of the inflexible fuel-management strategy. We are working on a modified fuel-management strategy with ARPANSA, our nuclear regulator, and hope to have this in place by July 2009. This will make scheduling more reliable and predictable.

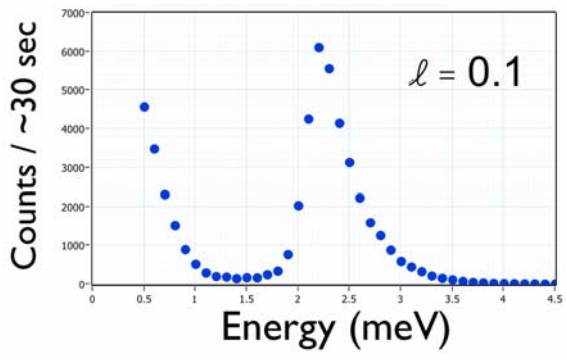
Around the instruments

As of the beginning of April 2009, 70 experiments had been carried out and 32 external researchers had used our neutron instrumentation.

At present, a call for proposals on all seven instruments and on the National Deuteration Facility (bio-deuteration only) is open, with a deadline of 8 May 2009. See page 3 for more details.

Taipan *(thermal three-axis spectrometer)*

The Taipan team achieved a major commissioning milestone on February 16 with the first measurement of a phonon. A transverse acoustic phonon was measured along the [001] direction in a single crystal of elemental niobium. The measured intensity (below) is impressive for this early stage of Taipan's operation.



Echidna *(high-resolution powder diffractometer)*

A new monochromator (Ge, <335> cut, variable focus) has been commissioned which dramatically increases Echidna's flexibility in terms of its neutron wavelength range and available intensity/resolution combinations. The instrument configurations may be explored with the interactive simulator on the instrument web page:
http://www.ansto.gov.au/research/bragg_institute/facilities/instruments/echidna/specifications
in order to match instrument performance to material complexity before the experiment.

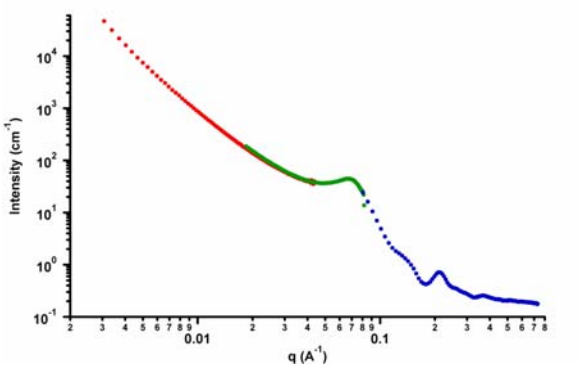
Above: The new Ge <335> monochromator: the array of 23 Ge wafer stacks under test at AZ systems in France prior to shipping to Australia in late 2008. Each of the crystal stacks can be individually oriented.

The first user experimental teams to take advantage of this new Echidna setup included: Patrick Allen & Siegbert Schmid (U. of Sydney); Erich Kisi (U. of Newcastle) & Daniel Riley (U. of Melbourne); and Jessica Hudspeth (ANU) & Michael James (Bragg Institute).

Quokka *(small-angle neutron scattering, SANS)*

Quokka commissioning achieved an important milestone in March with the successful conversion of scattering data to an absolute scale over the whole range of available camera lengths (1.3 – 20m). The figure shows absolutely normalized merged data sets from three different configurations of the Quokka instrument, achieved using a modified version of the IGOR-based data-reduction and analysis suite written by Steve Kline at the NIST-Center for Neutron Research. The measurements are of a binary paraffin mixture: a 2:1 molar mixture

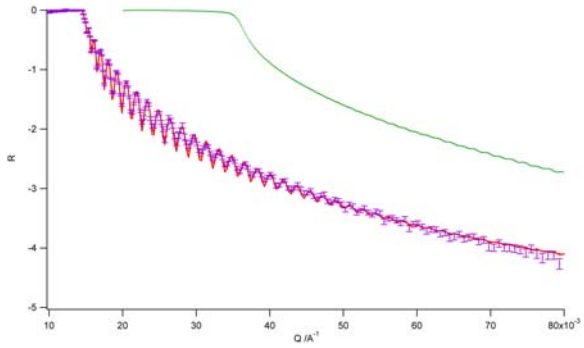
of two normal-alkanes of 28 and 36 carbons for which the longer chain has been deuterated. The data cover a Q range from 0.003 to 0.8 $Å^{-1}$ and the total data collection time was 4.5 hours. We have recently installed a focusing MgF_2 lens and prism optical system which will allow Quokka to reach its low Q design limit of 0.0008 $Å^{-1}$. We are also planing to modify the detector window geometry to achieve a high Q limit of about 1.3 $Å^{-1}$.



Merged Quokka data: red points are a low Q configuration with detector at 20m; green with detector at 10m; blue is a high Q configuration with detector at 4m from the sample position.

Platypus *(reflectometer)*

Platypus broke the 300nm barrier on the 10th of February, when it successfully took neutron reflectivity data on a 325nm thick film of alumina deposited on silicon. The figure shows neutron and X-ray data from the same film: the narrow spacing of the fringes determines the film thickness and indicates that our instrument can operate well in high-resolution mode. In this case the neutron data appear substantially better in quality because there is more contrast between alumina and silicon with neutrons than with X-rays (the green curve). *The sample was prepared by Dr. Gerry Triani in ANSTO's Institute of Materials Engineering.*



Our first paper from Platypus has been published, in *Macromolecules*, on the micro-phase separation of the block co-polymer polymer PMMA77-PBA23. The work was a collaboration between the Key Centre for Polymer Colloids (University of Sydney) and the Bragg Institute.

Pelican *(time-of-flight spectrometer)*

On 30 March 2009, 205 ^{3}He position-sensitive detectors for Pelican arrived at ANSTO from Toshiba, Japan. This follows the delivery of the first 5 detectors to the manufacturer of the data-acquisition electronics in Germany in December 2008. The full complement of 210 detectors required for the Pelican instrument has now been delivered. Pelican's radial collimator has also been delivered from JJ X-ray, Denmark.

An array of 10 detectors is unpacked.

Sika *(cold three-axis spectrometer)*

The first delivered items for the SIKA cold-neutron 3-axis spectrometer, roughly 50 m^2 of polished black granite for the instrument dance floor, were received in early February. The instrument components will move around on high-precision air pads, under computer control, on this dance floor. SIKA, the 9th neutron-beam instrument at the OPAL reactor, is an $8M project funded by the National Science Council of Taiwan, and managed by the National Central University. The next major components, including the double-focussing monochromator system and the main monochromator shielding assembly, will arrive in mid-2009.

Announcements

Call for proposals – deadline 8 May

We have made our 3rd call for proposals for the following neutron-beam instruments and facilities:

ECHIDNA (high-resolution powder diffractometer)
WOMBAT (high-intensity powder diffractometer),
KOALA (Laue diffractometer)
KOWARI (strain scanner)
PLATYPUS (neutron reflectometer)
QUOKKA (SANS)
TAIPAN (thermal 3-axis spectrometer)
Bio-Deuteration (National Deuteration Facility)

Proposals for neutron-beam instruments and the National Deuteration Facility should be submitted using our on-line system, http://neutron.ansto.gov.au.

Users who have already carried out experiments on one of our neutron-beam instruments are required to fill in an experimental report: the Program Advisory Committee will take account of the track records of our users, in assessing the next round of proposals.

Proposals will be reviewed in May/June and the Programme Advisory Committee will assess proposals in its meeting in June or July 2009. Scheduling of the first beam-time allocations (subject to reactor operation schedule) is planned for September 2009.

Program proposals

We are also soliciting "program proposals", which are intended to enable a coherent program of research requiring multiple time allocations on one or more neutron beam instruments over a 3 year period. They are aimed at experienced groups, which can commit to providing round-the-clock experimental support for the whole program, with minimal support from Bragg Institute staff, and have a demonstrated track record of research using neutron scattering techniques. Successful programs will receive scheduling priority, with each instrument time allocation requested via a separate "Program Proposal Beamtime Request" proposal. The progress of each program will be reviewed mid-term, i.e. after 18 months. Up to 25% of the user time on each instrument will be available for allocation to program proposals. To apply for a program proposal select the "***May2009 Neutron Program***" round.

AONSA Neutron School 16-21 August 2009

This school provides training for newcomers to neutron scattering focussing on nano-science and will be limited to 40 people. We will not only have lectures, but also practical sessions with hands-on experiments and data analysis. All neutron techniques (available at ANSTO) will be covered in the school, i.e. powder diffraction, single-crystal diffraction, strain scanning, small-angle scattering, reflectometry, and inelastic scattering using three-axis spectrometers.

This is the 2nd Neutron School organised by the Asia-Oceania Neutron Scattering Association - AONSA. The first school was held in 2008 in Korea. Participants will be selected based on an abstract outlining an aspect of their scientific project, to be presented as a poster at the school. The abstract should also address how neutrons could help in their research projects.

Deadline for abstracts: 28 April 2009.

For further details about the school, see www.ansto.gov.au/research/bragg_institute/current_research/conferences_and_workshops/second_aonsa_neutron_school_2009

Faces

Newcomers:

Warren Brown has joined the Bragg Institute computing and electronics group as an electrical technician. He will be primarily working on the new neutron beam instrument projects.

Clemens Ulrich is newly arrived from the Max Plank Institute for Solid State Physics in Germany. He has taken up a joint UNSW-ANSTO faculty position, and will be researching strongly correlated electron systems such as high-T_c superconductors, using inelastic neutron scattering.

Maciej Bartkowiak is a joint PhD student between Curtin University and the Bragg Institute. Maciej is studying the effects of oxygen substitution in multi-ferroic materials.

Departures:

After two and a half years running the Bragg Institute User Office, Herma Buttner is moving to ANSTO's Executive Team in a Research Policy and Management capacity. We wish her well and will miss her greatly. Richard Garrett is taking over responsibility for the User Office, in an acting capacity.

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