Bragg Peaks
> for neutron users
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Call for proposals on powder diffractometers ECHIDNA and WOMBAT.

OPAL news

After a fuel change, the OPAL reactor resumed operation on 22nd of February and ran until 10 March. Repairs to components of the cold-neutron source system were completed by 24th March and initial commissioning tests have been completed. The second stage of the cold-source commissioning is now underway: testing it under different conditions up to full reactor power.

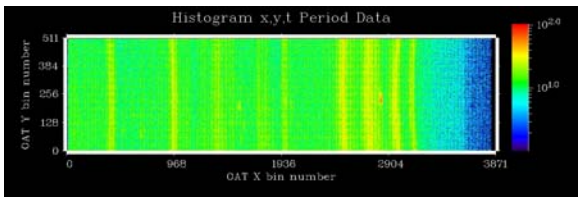
In the reactor itself, there is some seepage of light water into the heavy water in the reflector vessel leading to slight impurity of H_2O in the reflector vessel. The impurity level is being monitored carefully to ensure sufficient heavy water quality is maintained. INVAP, the reactor supplier, is holding a design review meeting together with ANSTO in late April to evaluate the various repair strategies being investigated.

Around the instruments

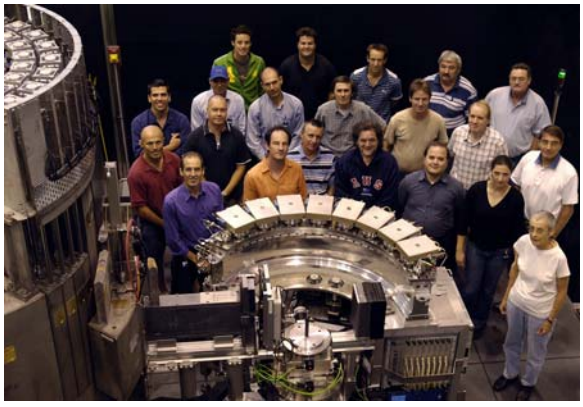
We are now calling for proposals on the two powder diffractometers – ECHIDNA and WOMBAT – which have successfully collected their first patterns. For more details please look under the instrument section and announcements.

Wombat *(high-intensity powder diffractometer)*

On the 26th February, Wombat collected its first diffraction pattern:



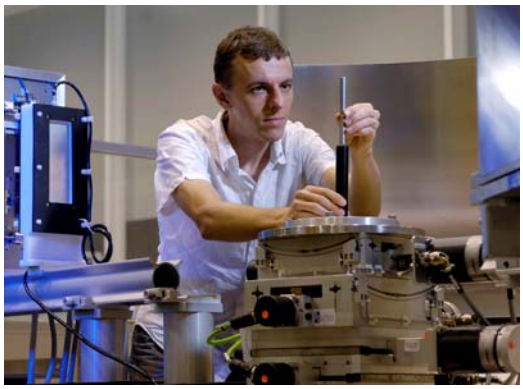
The instrument (see photo below with some of the team who worked bringing Wombat on-line) is currently being hot commissioned in pursuit of its operating licence. Early indications are that Wombat will achieve its design specifications, with near flawless performance from the detector (built by Brookhaven National Lab., USA) and excellent flux at the monochromator position.



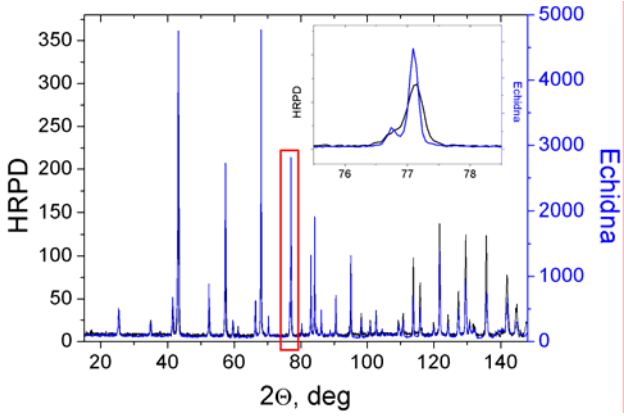
In initial measurements with the instrument configured similarly to MRPD (medium-resolution powder diffractometer) on HIFAR, a standard MgO sample produced 100,000 counts per second into the Bragg peaks, which the detector handled with ease. A 25 mg test sample is also proving to be no challenge to the instrument.

Echidna *(high-resolution powder diffractometer)*

The first diffraction pattern on Echidna was taken in December 2006, with comprehensive hot commissioning beginning in February 2007. Initial measurements were performed at a 90° takeoff angle with the Ge<115>, with more recent results at 130°. Two Germanium monochromators will be available: Ge<115> (single reflection only) and Ge <335> (multiple reflections available).



The results below show initial (right-hand scale) measurements from an Al_2O_3 standard at a 90° takeoff angle, which is the poorest resolution position on the instrument, compared with data taken at HIFAR's high-resolution powder diffractometer HRPD (left-hand scale).



Neutron powder diffraction data for Al_2O_3 collected for ~5h; HRPD: $2\Theta_m$=120˚, λ=1.49A; Echidna: $2\Theta_m$=90˚, λ=1.54Å).

Koala *(quasi-Laue diffractometer)*

Commissioning of Koala has commenced, but is now delayed due to difficulties in the instrument control system. Koala is to be returned to the manufacturer in France for repair and at the same time, an upgrade to the instrument interface is being planned which will facilitate reliable running of the instrument. In the meantime, data extraction, reduction and analysis software packages are being installed and reviewed in preparation for the large data flows which can be anticipated from the instrument.

Platypus *(reflectometer)*

Installation and commissioning of Platypus is going at breakneck speed. The Gumtree control software has been installed on the instrument and is now being used to drive our slit system motors around. We are currently testing the accuracy and reproducibility of these motorised axes.
In addition, a large amount of bunker and detector shielding has been fabricated and is in the process of installation.

Meanwhile, our multi-position, hermetically sealed, air-liquid trough has been manufactured (based on design by ISIS, the neutron spallation source in the UK), and is currently being anodised to a lovely cobalt blue colour.

Quokka *(small-angle neutron scattering)*

Quokka's instrument guides were installed at the beginning of this year and the concrete tunnel shield over this collimation section was put in place late in February. The last major pieces of the instrument, the concrete shielding walls for the sample area and the connection of the tunnel to the velocity selector bunker have now begun to arrive - these will be installed over the next few weeks. Work on detector tank alignment is now complete, but continues on the detector itself and motor cabling for the instrument.

Quokka at full length in early February during the guide installation in the collimation section (before shielding tunnel placement).

Taipan *(thermal three-axis spectrometer)*

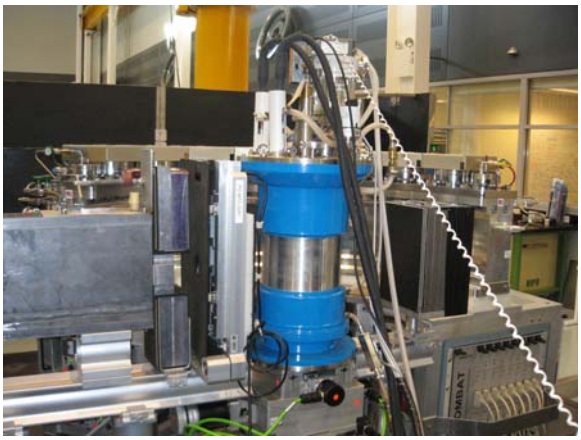
Taipan's pyrolytic graphite monochromator, see photo, arrived at the end of March. The monochromator shielding is being installed; installation in general progesses well.

Ancillary equipment

First testing of sample-environment equipment on Wombat

A 0-1600°C vacuum furnace (Institut Laue-Langevin type) is shown below, mounted for the

first time on the Wombat high-intensity powder diffractometer for commissioning experiments. The design of a 2nd furnace, with the ability to undertake studies at high temperature under a variety of different gas types is close to completion. Delivery is expected later this year.



Testing of the 20-position sample changer for the Quokka small-angle neutron scattering instrument

Based on a design at the NIST facility (National Institute of Standards and Technology, Centre for Neutron Research) in the USA, a 20-position sample changer, heated and cooled via a Julabo water bath, has begun acceptance testing. It should be available as Quokka comes on-line in mid 2007. Additional information on the sample environment ancillary equipment at Bragg can be found at http://www.ansto.gov.au/ansto/bragg/ancillaries/index.html.

Announcements

Call for proposals: deadline 27 April 2007

The two powder diffractometers ECHIDNA (high-resolution powder diffractometer) and WOMBAT (high-intensity powder diffractometer) have now successfully taken their first diffraction patterns. Therefore, **we have opened our call for proposals** for these instruments.

Proposals should be submitted using a neutron-beam application form - download from http://www.ansto.gov.au/ansto/bragg/news/index.html. Unfortunately, our new on-line proposal system is not yet available for multi-user access. During its test phase we have experienced problems in the operation of the new on-line system, to the point that we have decided for now to use the form previously used for HIFAR proposals, but updated for OPAL. Completed proposals should be **submitted electronically by emailing to bragg_user_office@ansto.gov.au by 27 April 2007.**
Please note that this form (word file) does not support special characters.

The application is for beam-time requests and *does not automatically include travel or accommodation support*. However, successful applications from researchers from AINSE member institutions (see http://www.ansto.gov.au/ainse/memuni.html for AINSE member institutions) will automatically be forwarded to AINSE for consideration of travel/accommodation support. The form should be completed with the Hide/Show button (¶) turned off as sections that are not relevant are hidden. When printing "Print Hidden Text" box should not be enabled.

27 April:	Deadline for proposals;
May	Electronic review of proposals by up to 5 expert reviewers;
31 May:	First meeting of the Program Advisory Committee (proposal assessment);

August/September: Scheduling of first beam-time allocations (subject to issue of instrument operating licensing by ARPANSA). Initial scheduling will likely be fairly "loose", with ~50% of the beam time made available for the formal user programme.

Commissioning of instruments

instrument	*commissioning*	*Friendly-user experiments expected to start*
Echidna	commenced	June
Wombat	commenced	June
Kowari	start in April	July
Koala	commenced, but repair required	October
Platypus	start in May	August
Quokka	start in June	September
Taipan	start in July	September

After the commissioning phase all instruments will have friendly user experiments for 2-3 months, before they will be officially scheduled.

Festivities surrounding the OPAL reactor

The official opening of the new neutron-beam facility will be on 20 April 2007, preceded by a science / business day.

Exhibition in Powerhouse Museum, Sydney

The Powerhouse Museum in Sydney will launch an exhibition on nuclear science called 'nuclear matters' in June this year. It will feature a range of nuclear interactives, many based on ANSTO science and operation.

National Deuteration Facility at ANSTO

Funding of $3.3 million under the National Collaborative Research Infrastructure Strategy for a National Deuteration Facility was announced last year. Combined with ANSTO's direct contribution, a total of $7.4 million will be spent on the facility which will provide laboratories and expertise in both chemical and biological deuteration of native and synthesised molecules to enhance the range and increase the probability of success of science conducted using the neutron instruments at OPAL. The funding includes a staffing level for 6-7 staff and contractual arrangements with the Department of Education, Science & Technology are currently approaching completion.

Faces

In the last months, the Bragg Institute welcomed four new postdoctoral researchers:

Roland Bircher (left top) is investigating single-molecule magnets using neutron techniques.

Milen Gateshki's (right top) expertise is in high pressures and high temperatures applied in mineralogy.

Damian Martin-Rodriguez (left bottom) works on neutron-optics developments with regard to expanding the OPAL neutron-beam facility.

Sergey Yakovlev (right bottom) is interested in synthesis and structural characterisation of perovskites and related materials.

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