

OPAL news

OPAL's cold-neutron source returned to service on 14th May, and has run continuously since then, allowing for the commissioning and first polarised-neutron user experiments on Platypus. The OPAL reactor itself ran reliably from most of the last quarter, before losing two weeks immediately after the scheduled June shutdown. Unfortunately, as a consequence, significant disruptions occurred to our user schedule, both due to the lost time and due to the knock-on effects of subsequent schedule changes: all affected experiments have now been rescheduled, and we apologise to the affected users for this disruption.

In the last quarter (April-June), our five operating thermal-neutron beam instruments used 80% of the beam time from OPAL for user-program experiments.

Bragg Institute news

Following the disaster of the Great East Japan Earthquake/Tsunami in March 2011, both the JRR-3M research reactor and J-PARC spallation neutron source have been out of action. To assist our Japanese friends, we have offered beamtime on Echidna and Kowari for approved experiments diverted from JRR-3M. We look forward to hosting these researchers during the term of their experiments, which will be run between July and October.

After a refurbishment of its 1m² position-sensitive detector, Quokka returned to service in early July. Some experiments have already been done, including complete recalibration of the instrument, and user experiments will be scheduled soon. The second (spare) detector has also been shipped back to ORDELA in the USA, in preparation for its refurbishment,

Around the instruments

Pelican and Sika

There has been tremendous progress on our two new cold-neutron spectrometers, Pelican and Sika, over the last few months, and we are now making a big push to have both ready for neutrons at the end of 2011.



The Pelican vacuum tank being manually guided into position on its dancefloor.

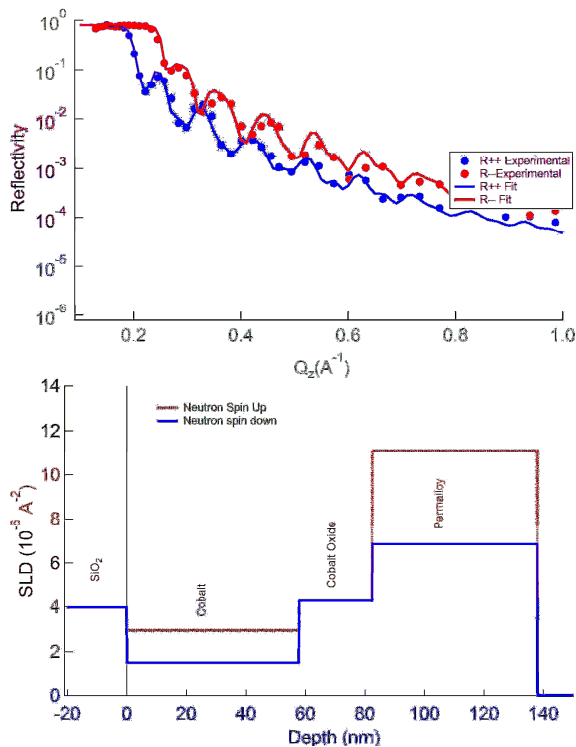
All components of the Pelican time-of-flight spectrometer are at ANSTO, and the 6-tonne all-aluminium vacuum vessel has been successfully vacuum tested, delivered and installed. The choppers and incident-beam polariser have also been tested and installed. Detector installation is about to commence, and we already have the commissioning licence from the regulator. Congratulations to instrument scientists Dehong Yu and Richard Mole – and watch this space!



View of the preassembled SIKA primary and secondary spectrometers from the bunker entrance during the NSC review.

The Sika cold-neutron 3-Axis Spectrometer, which is funded, built and operated by the National Science Council of Taiwan, is at a similar state of development: all components except for the sample stage are at ANSTO, and the shielding walls are in place, as is the complicated multi-analyser/detector system. Congratulations to Charlie Wu and Wen-Hsien Li who are coordinating these activities.

Platypus (neutron reflectometer)

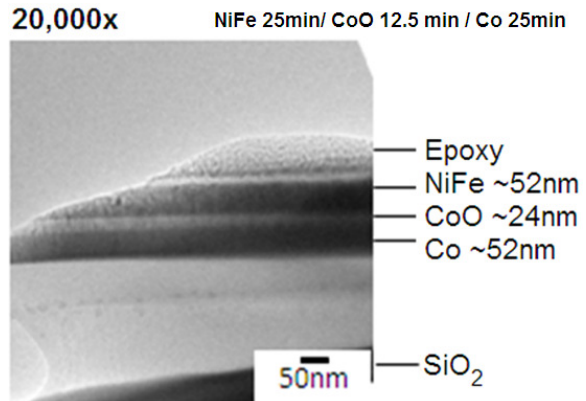


Top: Polarised neutron reflection patterns of the samples grown by ion-assisted sputtering, with preliminary fits to the data using the layer profile provided by TEM, and; Bottom: Magnetic depth profile extracted from the neutron fits of the system during a partial magnetic reversal show the trilayer structure on a SiO₂ substrate.

We have successfully performed our first polarisation-analysis experiments on Platypus, on a magnetic sandwich including the classic ferromagnets Permalloy (a nickel-iron alloy) and cobalt, with a thin cobalt-oxide layer spread between them. The bottom and top layer were selected to provide harder and softer magnetic switching points respectively so that top layer could be controlled independently by tuning the magnitude of switching field. This design concept is highly related to the spin valves used in today's hard-drive read heads, but in this case, we are using the spin-valve like structure to probe the coupling between the top and bottom magnetic layers for hints of competition across the spacer layer. The primary question being addressed was the coupling mechanism between the two magnetic layers and whether this involved the spin structure of spacer layer or was simply due to magnetostatic effects.

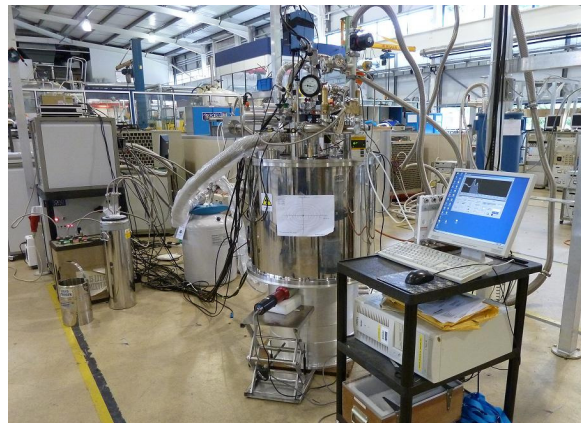
Combined with x-ray reflectometry and cross sectional TEM, polarised neutron reflectometry

is ideally suited to understanding how structural properties such as interface roughness and spacer layer thickness affect technologically desirable magnetic properties.



A cross sectional TEM image of the nano-sandwich

Sample Environments: 12-T Magnet and dilution insert



Top: The 12-T magnet being tested on the factory floor and; Bottom: the sample sticks for the 12-T magnet.

Factory acceptance testing of the 12-T magnet and dilution-refrigerator insert has been successfully performed at the Oxford Instruments factory in England. The magnet showed outstanding performance with only a few minor adjustments needed before shipping to Australia, while the dilution insert successfully attained a minimum temperature of 17.1 mK

during testing. The system arrived at ANSTO on 26 July. After an initial testing phase, the system is expected to be available for user experiments in November 2011.

Polarised Helium-3 Project



The ³He lab support in place above the neutron cold guides.

The Institute is working, with the Institut Laue Langevin in Grenoble (France), towards the installation of a helium-3 polarising system, based on the metastable-exchange optical pumping method.

The support platform for the ³He polarising station has arrived and been installed on top of the guide bunker within the Neutron Guide Hall and close to our Pelican time-of-flight spectrometer, which will be one of the major users of polarised ³He gas.



Four of the recently fabricated in-beam polarised ³He glass cells.

Recently, the first batch of in-beam glass cells for some of our instruments were successfully pressure tested in Grenoble, where they and a complete ³He polarising system are being fabricated and assembled. The cells typically operate at up to 4 bar, and all four cells were tested to 50% beyond that. Each cell will be

baked, filled with ³He gas, and then the spin-polarisation of the ³He gas along with the polarisation lifetime are to be tested. The four cells shown here will be used on Wombat, Taipan, Platypus and Quokka. Smaller cells will be used on Sika, and a larger one on Pelican.

The polarised ³He project is led by Hal Lee.

Long-Term Visits by NIST Staff



Left to right: Craig Brown, Yamali Hernandez and Juscelino Leao.

The Institute is currently hosting three scientists from our sister facility, the NIST Center for Neutron Research in Washington DC. NIST operates a 20 MW reactor that is presently undergoing a 10-month shutdown to install a second cold-neutron source, additional guides and a second neutron guide hall. Craig Brown, Yamali Hernandez and Juscelino Leao will be staying with us into 2012.

Australian Synchrotron and Neutron New Users Symposium held at UNSW



Scientists from the Bragg Institute and the Australian Synchrotron joined forces at the Synchrotron and Neutron New Users Symposium, held at the University of New South Wales, in July, to welcome members of the future scattering community to the opportunities

for research and unique applications that can be achieved using both neutron and synchrotron scattering facilities.

No fewer than 220 potential new users from around Australia and New Zealand attended the symposium. PDFs of presentations from this event are available [here](#).

Announcements

2011 4th AONSA Neutron School

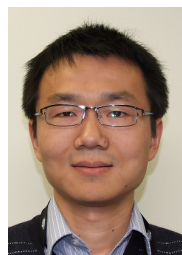
The 4th AONSA Neutron Scattering School, which was scheduled to be held jointly by JRR-3M and J-PARC, will now be hosted at ANSTO. The lecture series and first-hand neutron scattering experience will run 12-17 November. Students will be drawn from a range of countries from the Asia-Oceania region. More information on the Neutron School is available [here](#).

Call for Proposals

The 2012-1 Proposal Round for beam time January – June 2011 and access to all 7 initial neutron-beam instruments and the National Deuterium Facility is now open. Proposals should be submitted online by **15 September 2011** at <https://neutron.ansto.gov.au>.

New Faces

Arrivals



The Institute welcomes Guochu Deng, as instrument scientist for the Sika cold 3-Axis Spectrometer. Prior to joining us, Guochu was with the SINQ neutron source at the Paul Scherrer Institute in Switzerland.



Jin Lee is with the Data Acquisition and Electronics Group to assist in the design, development and commissioning of neutron instrument electronic systems as part of the NBI2 project. Jin has 14 years experience with the design, repair and

maintenance of biomedical and scientific instruments



Andrew Berry joins us from Monash University where he was involved with the Collaborative Research Centre in Biomedical Imaging Development, developing a CdTe Energy resolving pixel detector for medical computed tomography applications. Andrew has previously developed detector systems for the Daresbury and other European synchrotrons.



Matthew Sale, a Masters student at the University of Wollongong is researching under the supervision of Maxim Avdeev (ANSTO) and Dr Jiazhao Wang (Wollongong). Matthew is using computational and experimental methods to study materials for electrochemical and energy-storage applications.

Departures



After 24 years of service to ANSTO, Margaret Edmondson retired in early June. Margaret had been personal assistant to Dr John Boldeman of the old Physics Division, and provided administrative support to the Australian Synchrotron Research Program and Bragg Institute User Office. We wish Margaret well!

Contact us

Bragg Institute User Office, Building 87, ANSTO
 Locked Bag 2001, Kirrawee DC NSW 2232,
 Australia
 T +61 2 9717 7232, F +61 2 9717 3606
 E bragg-user-office@ansto.gov.au
www.ansto.gov.au/research/bragg_institute