Issue 5 | September 21

Scatter Matters

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From the Director's desk

I hope that 2021 is progressing well for you as we navigate these challenging times across the world. As you may be aware, Sydney is currently in a COVID lockdown which is significantly impacting our operations. Since July 2021 most ACNS staff have been working from home and we have ceased our user operations. We are committed to undertaking approved proposals, however, we anticipate that lockdown restrictions will continue for some months, resulting in a number of these experiments to be undertaken during the first part of 2022.

In response we have made the difficult decision to extend the deadline for our 2022-1 proposal round to 15th February 2022. We understand that this decision may make it difficult for students and early career researchers to progress in their careers and we will consider Discretionary requests for access for those affected.

The 2022-1 round will be conducted under anonymous review processes as part of a trial with the Australian Government's Women in STEM Ambassador. We have also moved the 2022-1 proposal round to the ANSTO Research Portal (ARP). We had been planning the transition to the ARP in 2022, however the anonymous review trial has expedited the transition and we will be migrating data from the ACNS legacy portal into the ARP in early 2022. I would like to thank the staff involved for their hard work enabling this transition.

You may be intrigued as to what work went on during our May-July 2021 long shutdown, and in this newsletter we have an interview with the TG123 In-pile assembly and primary shutter replacement Project Manager. We would like to thank the superb project team that was assembled with staff across ANSTO to deliver this project.

We would also to extend our appreciation to those who have participated in the 2021 National Research Infrastructure Roadmap and ANSTO Decadal Plan surveys. Your valuable input into these activities will ensure that we continue to serve the user community into the future.

Congratulations to the winners of the ACNS & NDF Impact Awards. These case studies are invaluable to us and will be utilised on our website, brochures and with stakeholders.

We are looking forward to seeing you at the hybrid virtual ANSTO User Meeting (AUM2021) on 24th to 26th November 2021. The abstract deadline closes on 17th September – so don't delay!

Jamie Schulz

Issue 5 | September 21

Scatter Matters

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ANSTO Research Portal

Merit access proposals for the Australian Centre for Neutron Scattering (ACNS) neutron instruments and the National Deuteration Facility (NDF) are to now be submitted via the ANSTO Research Portal. As part of this, a new proposal type now available, a combined Deuteration/Neutron proposal for research work requiring access to both ACNS and NDF.

The following list of proposal types are available for submission:

Neutron – merit access proposal to the Australian Centre for Neutron Scattering instruments and capabilities.

Deuteration/Neutron - merit access proposal for ACNS instruments and NDF capabilities where deuterated materials are required for the proposed neutron experiments.

Deuteration - merit access proposal for NDF capabilities. This proposal type is for overseas neutron experiments or for non-neutron applications (e.g. NMR and Mass Spectometery).

Program, Neutron: merit access proposal for access to one or more ACNS instruments and capabilities for a program of research of up to 3 years.

Program, Deuteration/Neutron - Merit access proposal for a program of research of up to 3 years for access to both ACNS instruments and NDF capabilities, where deuterated materials are required for the proposed program of research with ACNS neutron instruments.

Program, Deuteration - merit access proposal for a program of research of up to 3 years for access to NDF capabilities of biological and/or chemical deuteration or multiple isotopic labelling. This program proposal type is for overseas neutron experiments or non-neutron applications (e.g. NMR and Mass Spectrometry).

Please note: Neutron and combined Neutron/Deuteration proposal type submissions will be subject to the Anonymised Review trial for the current round. Further information can be found on the Anonymised Review website.

ACNS & NDF 2022-1 Proposal Round

As many of you would be aware, Sydney currently has significant lockdown restrictions in place due to increasing numbers of COVID Delta strain in the community. At present it is uncertain when ACNS and NDF can resume normal user operations and a decision has been made to extend the upcoming 2022-1 round deadline (which was previously set for September 2021), and to only have one call for proposals in 2022.

Proposals may be submitted and amended until 11.59pm, 15th February 2022. Please contact the user.office@ansto.gov.au if you need to amend an already submitted proposal.

For NDF users who wish to receive their deuterated or isotopically labelled molecules in the first half of 2022 (January-July) for experiments scheduled

outside Australia or for non-neutron experiments such as NMR or mass spectrometry, please contact NDF via ndf-enquiries@ansto.gov.au to discuss further.

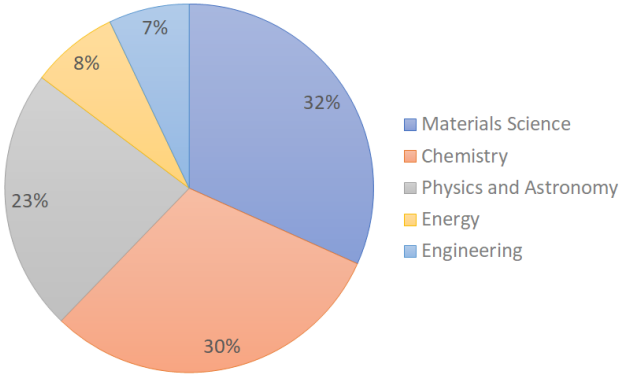
ANSTO will continue to monitor the COVID situation and the impact this has upon current commitments and future availability for merit access to ACNS instruments and NDF capabilities.

News from the Instruments

Diffraction

500 Papers using Echidna data

After 14 years of an open user program, the high-resolution powder diffractometer Echidna has reached a milestone of 500 journal papers with high-profile results published in Nature Materials, Nature Communications, Angewandte Chemie, Journal of the American Chemical Society, Physical Review Letters, and other top journals. The publications cover a very broad range of disciplines and topics from fundamental magnetic structural studies to quantitative phase analysis of industrial and geological samples with the materials science, chemistry, and physics communities being almost equally represented.



This success was possible only through a combination of exceptional OPAL reactor availability and reliability, ACNS staff dedication, and of course the efforts of the many Echidna users from Australia and 36 other countries.

Echidna team

Engineering & imaging

The Invisible Revealed exhibition

Sydney's Powerhouse Ultimo Museum of Applied Arts and Science is collaborating with our staff to use a combination of ANSTO's neutron, synchrotron, and particle accelerator-based capabilities to analyse artefacts from the museum collection to provide insights into how these artefacts were manufactured, and how they can be better conserved for future generations. The results of this project will form the basis of the museum's upcoming exhibition: The Invisible Revealed.

The Invisible Revealed exhibition will illustrate the discoveries of ancient and modern artefacts made using ANSTO's scientific instruments by presenting a selection of the original artefacts alongside computer-generated 3D visualisations and other imagery that reveal their structural secrets. Scale models and details of ANSTO's facilities will be exhibited to give an appreciation of the achievements of Australia's diverse scientific and technical talent.

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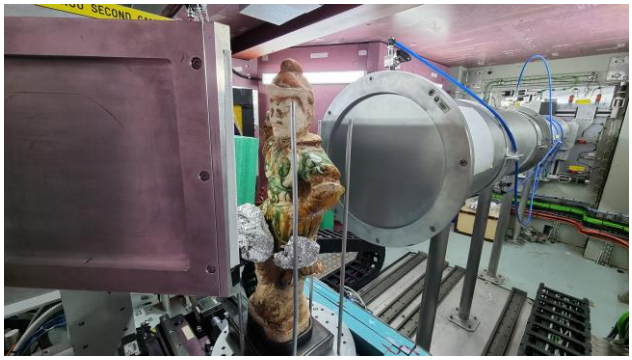
Dingo instrument scientist, Joseph Bevitt, has led or coordinated the data acquisition of over 40 objects range of items including Japanese Samurai swords, an ancient Greek sculpture, miniature cameras, ancient cloths, tree rings, Geiger-Müller counter and WWII error cipher machine. The image below highlights one example, a T'ang dynasty Lokapala tomb guardian, c. 700-750 AD, being neutronCT scanned on Dingo.



The Invisible Revealed, is scheduled to run 12 November 2021 – 6 March 2022, though likely to be postponed due to the local COVID-19 situation. Head to our website learn more about ANSTO's Cultural Heritage project and relevant capabilities.

Inelastic

Retirement of Sergey Danillikin

In April the ACNS farewelled Sergey Danilkin as he transitioned to retirement after 17 years of service. Sergey joined the ACNS in 2004 and assumed responsibility for the design and commissioning of the thermal triple axis spectrometer, Taipan, at the OPAL reactor. Initially part of the Physics division, Sergey remained during the Bragg years and finally as part of the ACNS. Taipan entered the user programme in 2010 and has been a fundamental part of the user programme since this time. Within the user programme, Sergey contributed to many of the papers from Taipan, including work on iron arsenide superconductors and caloric materials.

As well as his work with the user programme, Sergey is renowned internationally for his work on superionic conductors and thermoelectrics.

I would like to take this opportunity to wish Sergey well in his retirement.

Following the retirement of Sergey there have been a number of changes to the inelastic scattering team at ACNS. Guochu Deng who was formally an instrument scientist on Sika and an instrument associate on Taipan has reversed roles and is now an instrument scientist on Taipan and instrument associate on Sika. The Taipan team now consists of Guochu Deng, Kirrily Rule and Anton Stampfl as instrument scientists, while Sika has Shinichiro Yano as an instrument scientist and Guochu Deng, Kirrily Rule and Chun Ming Wu as instrument associates. All triple-axis team members are keen to hear from both new and returning users alike.

Richard Mole

Issue 5 | September 21

Scatter Matters

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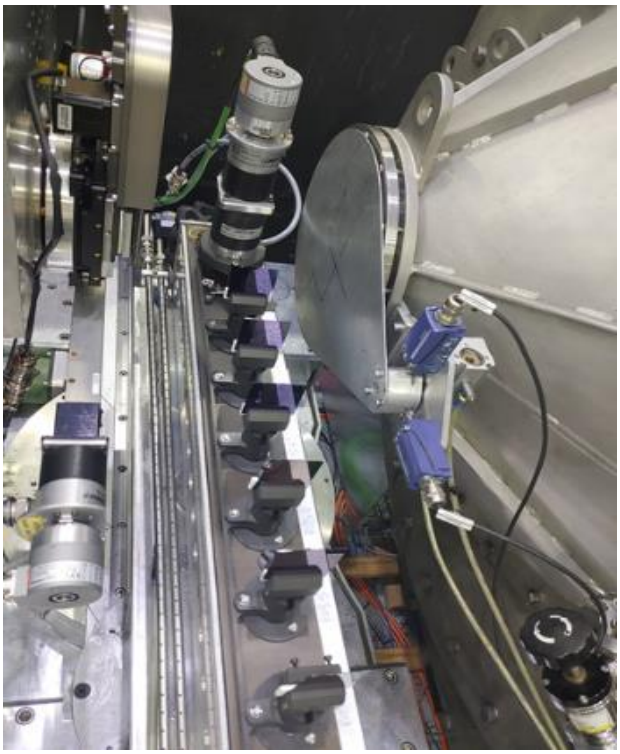
Reflectivity

ACNS users interviewed by Cosmos magazine

Cosmos magazine recently interviewed AINSE PGRA scholars Hayden Robertson (University of Newcastle) and Isaac Gresham (UNSW), and ANSTO scientist Andrew Nelson about their work on stimulus sensitive polymer brushes. These systems are polymer chains that have one end attached to a surface, with the brushes changing in conformation when exposed to different pH, temperature, or different kinds of salt. Such systems have a wide range of potential applications, such as mineral extraction or controlling biofouling. Neutron reflectometry is an excellent technique for characterising the detailed structure of these kinds of systems and has been heavily used by the collaborative team (co-investigators Profs Wanless and Webber at the University of Newcastle, A/Prof Prescott at UNSW and Dr Nelson at ANSTO) for many important studies on brush behaviour for instance https://doi.org/10.1107/S160057672100251X

Small Angle

GISANS on Quokka



The GISANS kit for Quokka

A nine-position sample changer designed for GISANS measurements using the small angle instrument Quokka has been commissioned and is now open for users. The new sample changer and associated slits were funded by the National Synchrotron Radiation Research Center (NSRRC) Taiwan. The 5x5 cm^2 sample size is designed for optimal batch measurement in 4 to 6 hours per sample, depending on how strongly the sample scatters. GISANS is a powerful tool to probe the behaviours between layers of materials. For example, the commissioning data below shows films of P(S-b-MMA)/PS blends for the different annealed temperatures at 230°C (a and c) or (b and d) 270°C have different corresponding GISANS 2D patterns.

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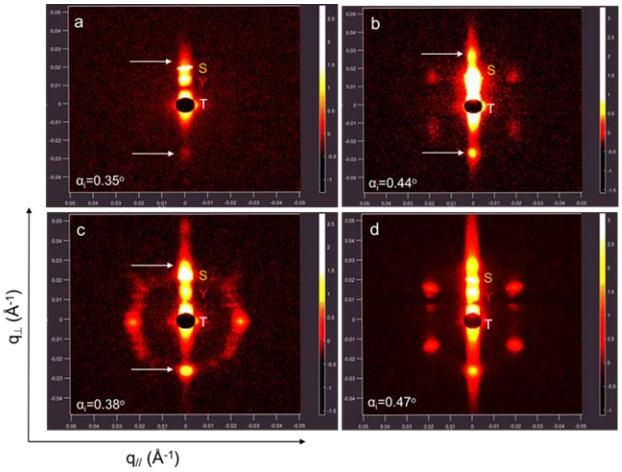
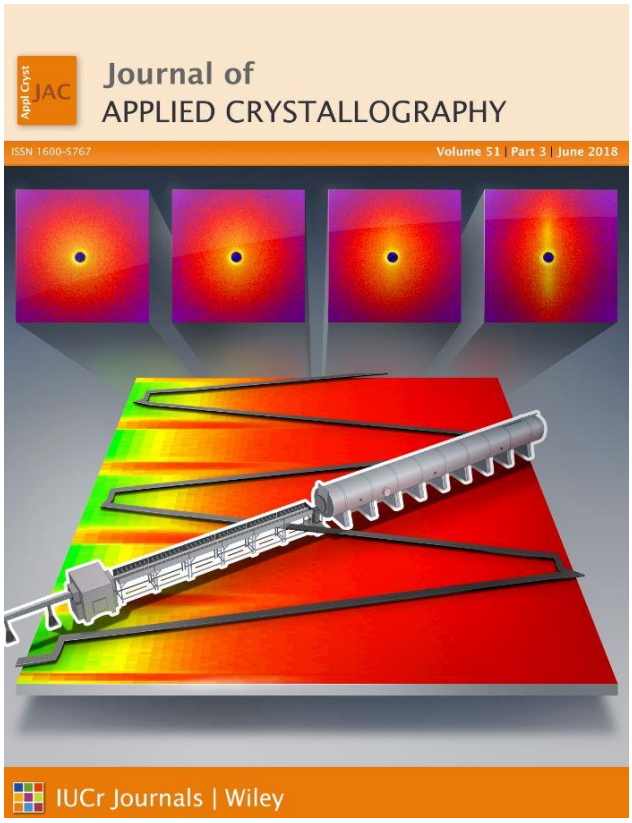


First data set of Quokka GISANS commissioning data from P(S-b-MMA)/PS block copolymer.

200 Papers for Quokka



In July 2021, our small-angle neutron scattering (SANS) instrument, Quokka, reached the milestone of 200 peer-reviewed publications; this is fewer than four years since the 100-paper milestone was achieved.

Covering a diverse range of scientific disciplines, Quokka is a 40 m monochromatic pinhole SANS instrument generating research outcomes in the areas of colloids, polymers, biology, food, magnetism, petrology and materials science. Data from the most recent 100 papers have been featured in a broad range of journals including Physical Review Letters, Physical Review B, Langmuir, Macromolecules, Soft Matter, Applied Biomaterials, Scientific Reports, Food Hydrocolloids and on the cover of the Journal of Applied Crystallography.

This success would not have been possible without the excellent availability and reliability of the OPAL reactor and cold source, the dedication of ACNS technical and scientific staff, and, of course, the exceptional efforts of the many Quokka users from Australia and around the world who continue to bring their materials for nanoscale exploration. The Quokka team would like to express their appreciation to all involved.

A small step for Kookaburra, a giant leap for Kookaburrians

Kookaburra is the Ultra Small Angle Neutron Scattering (USANS) Instrument at ACNS, ANSTO. Kookaburra is ideal to study structures from 100 nm to >20 μm for a large range of samples from both soft matter and hard matter fields. Kookaburra provides valuable knowledge to bridge the gap between nanoscience techniques and microscopy or imaging techniques. It is also often used in

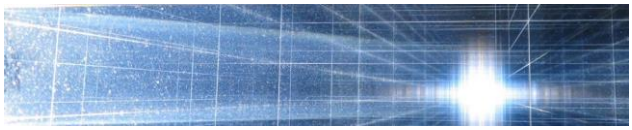
conjunction with one of the two Small Angle Neutron Scattering instruments at ACNS to extend the characterisation range from 1nm to >20 um.

Kookaburra published the first user experiment in 2014, and since then it has proven its unique place in Australian and international research. In just seven years, Kookaburra achieved 50 publications and contributed to several student theses. As more and more researchers now focus on the understanding of structures at multiple length scales, Kookaburra provides this capability; many times with *in situ* mode without destroying samples. This state-of- the-art instrument also hugely benefits from exceptional sample environments available at ACNS.

When an instrument achieves any success or milestone, it is of course not just the success of its instrument scientists who manages the instrument, but it is the success of many unsung heroes. Kookaburra grew to this level due to the exceptional support from various teams at ANSTO and is also due to tremendous support from the user community who has been excellent in supporting and improving Kookaburra through their experiments and feedback. Kookaburra heartily thanks to all these people who have made this journey possible.

Operations

TG3 primary shutter replacement project successfully completed.



Interview with Steven Pangelis, Project Manager

As users will be aware, our Neutron Guide Hall instruments have been in shutdown for an extended period of time this year, even prior to the current COVID restrictions. The shutdown has been necessary to replace the primary shutter of the thermal guides, TG123. The project is formally completed with the OPAL reactor back at power for the production of radiopharmaceuticals.

Steven Pangelis has been the project manager for this complex project.

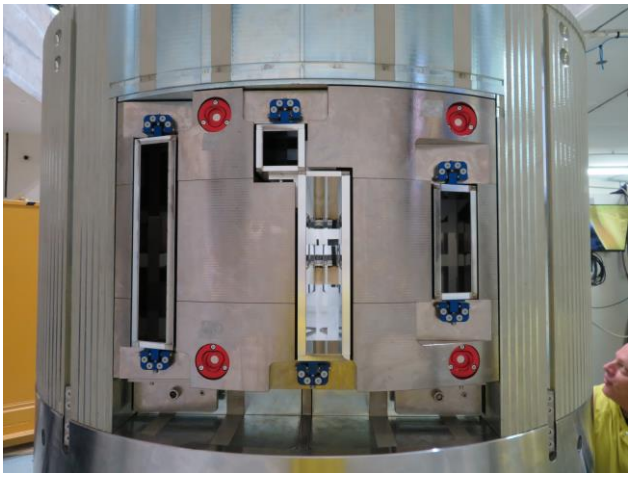
Q. Steven, you are not new to ACNS are you?

Correct, I started my ANSTO career at ACNS back in 2011. I was part of the graduate development program while working with the Scientific Operations and Sample Environment groups.

I worked on various engineering projects including instrument optics upgrades, commissioning of NBI2 instruments involving shielding and alignment rectifications, and other capital projects such as CG123 in-pile replacement and neutron guide glass remediation work.

I also worked on designing and upgrading several bespoke sample environment equipment including high pressure, vacuum, cryogenic and high temperature sample vessels, and equipment.

Q. What was the TG123 primary shutter replacement project?



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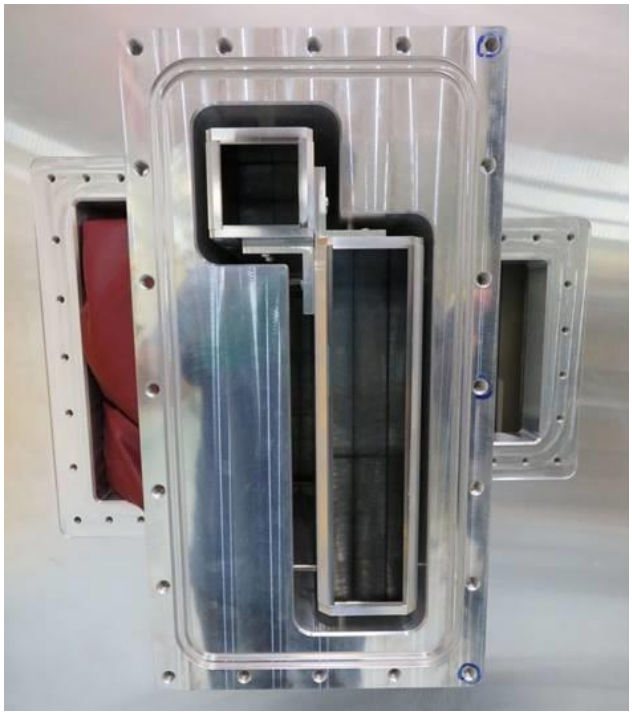
The aim of this project was to perform essential 10-year maintenance work to replace degrading in-pile neutron guides and service embedded primary shutter drive equipment including critical reactor LOCA (Loss Of Coolant Accident) seals and barriers.

There was also an opportunity to introduce two new thermal guides for future use, the TG2 split guide.

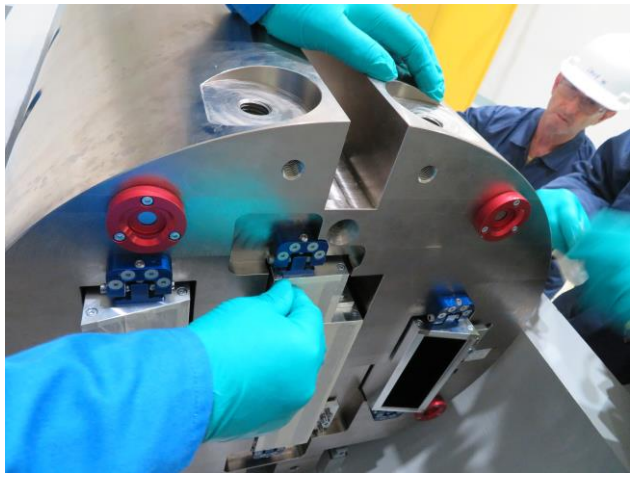


Q. I know that you and the team prepared this project for a long time, can you tell us a bit about it?

The project started back in 2016 for preparation of a 2019 long shutdown installation. However, the OPAL long shutdown was postponed twice and subsequently rescheduled for June/July 2021, which we just successfully completed.

The project deliverables were to address the lessons learnt from the CG2 in-pile replacement project, such as increasing the maintenance period of all the in-pile components from 10 to 40 years. This involved introducing longer lasting aluminium guides, designing radiation-hard in-pile bearings and relocating LOCA seals to allow accessibility for regular maintenance without the requirement to remove the primary shutter.

Q. Can you explain us which is the function of a primary shutter? How big is it? What were the challenges in removing it?



The primary shutter is a 9.5 tonne shield in the shape of a cylindrical wafer comprised of polyethylene and steel plates. It is 1.2m tall, 1.4m in diameter and rotates about its vertical axis. The function of the primary shutter is to shield against neutron and gamma radiation while in the closed position and transport neutrons down the out-of-pile guides in the open position.

The greatest challenge in removing the old shutter are the plastic bearings originally installed on the shutter. They are susceptible to degradation from radiation and combined with the weight of the shutter makes it a technically challenging and risky manoeuvre. There is a high consequence to the operation of OPAL and ACNS if the shutter were to become stuck and/or damage the embedded reactor rails during the removal process.

Q. It sounds like a very challenging project. What has been the most difficult part?

The most challenging part of the project was the metrology work involved with measuring and aligning the guides within tolerances of +/- 0.02mm.

Due to the global pandemic, Swiss neutronics [the company in Switzerland that provides the neutron guides] was not able to be present during the shutdown work. With short notice the project team was required to procure specialised equipment, create and validate detailed procedures, train staff, and ultimately execute all the guide alignment work within specification.

Q. Tell us a bit about the new shutter, what is different about it?

The old shutter used glass guides whereas the new shutter has longer lasting aluminium guides. It also has a new divergent split guide (TG2 A&B) that is positioned between TG1 and TG3.

Q. This is exciting, so we have the provision for a new neutron guide and potentially two new neutron beam instruments!

Yes, very exciting! With this new split guide, like CG2, we now have the provision to extend the guides out into the NGH and build at least two new thermal neutron beam instruments.

Q. Can you tell us something about the team that undertook the project?

The original project team was Kristian Veronika, James Alexander, and me. There have been many others who have worked on the project over the years, but recently the main team members include Greg Arthur, Matt Bell, Marty Jones, Jordan Malatesta, Steve Marfia, Merv Perry, Stewart Pullen, Scott Randall and Queenie Wong.

Q. So, a collaborative effort across all of ANSTO?

The TG123 in-pile replacement project team consisted of a cross-site multi-disciplinary team which operated in two shifts to minimise the downtime of the OPAL reactor and included staff from AME (ANSTO Maintenance and Engineering), OPAL, ACNS, AME Workshop, Waste Operations, Radiation Protection, Silicon Irradiations & ANM (ANSTO Nuclear Medicine).

Q. Is there any lesson learnt that you would like to share with us?

Always assume that existing/legacy drawings are not correct and have not been updated to as-built.

Q. Which are the last few bits to round-up when your team will be allowed back on-site?

On-site project work has been put on hold for an indefinite period due to the current COVID lockdown. There are a quite a few tasks to complete when we return to on-site work, but this should not delay the user program too much.

Thank you, Steven, congratulations to you and the team for the realisation of this successful project!

Paolo Imperia

Issue 5 | September 21

Scatter Matters

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NDF news

There are three modes of access available to NDF capabilities – Merit, User Pays/Collaboration and Commercial which are detailed on the NDF website.

The NDF utilises both Chemical Deuteration and Biodeuteration techniques. An extensive product list is available providing examples of the types of molecules and labelling accessible – please refer to the NDF Product Catalogue available for download.

For questions related to user access or to discuss options, please contact the NDF Leader and NDF User Program Manager via ndf-enquiries@ansto.gov.au

News and Highlights

NDF Science News and Highlights can be found here on the ANSTO website. Recent highlights showcase how deuterated cholesterol produced by the NDF was utilised in neutron studies for characterisation of structure of lipid nanoparticles used as mRNA delivery vehicles and new areas of COVID research.

More can be see on this at the ANSTO YouTube channel.

ANBUG News

News from the Australian Neutron Beam Users Group – see more and join the group here.

ANSTO User meeting – 24th to 26th November 2021

The ANSTO User Meeting this year will comprise a schedule of online webinars to allow scientists who have accessed ANSTO's landmark infrastructure, which includes the beamlines of the Australian Synchrotron, neutron scattering instruments at the Australian Centre for Neutron Scattering, and instruments at the Centre for Accelerator Science, to showcase their work during the last year.

The meeting will include a number at satellite venues with up to four hubs, where delegates can come together to watch sessions and interact.

ANBUG Awards

Our members will have already received an email about the upcoming ANBUG awards. If you would like more information, or a nomination form, please visit our website.

This year we will have a new award: the ANBUG Technical Award. This will be presented for outstanding service contributing to technical aspects of neutron scattering by university / facility staff or an instrument scientist. It is likely, but not necessarily, that it will be awarded to those who are traditionally not eligible for the other ANBUG awards, from areas such as engineering, sample environment, workshop or instrument staff that have gone above and beyond to facilitate your experiment.

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AONSA Young Research Fellowship

The Asia-Oceania Neutron Scattering Association (AONSA) is calling for nominations for their Young Research Fellowship Program, to help young researchers (within eight years of PhD completion) to help them to develop their expertise and career in neutron science and technology. The Program provides financial support for Fellows to visit major neutron facilities in the region for collaborative research using neutrons. More information can be found on the AONSA website.

Call for seminar suggestions

ANBUG continue to run neutron related webinars. If you have a specific topic you're interested in, please get in contact with ANBUG (secretary@anbug.net).

Achievements

AINSE Honours Students

Congratulations to the following students who were granted a 2021 scholarship from AINSE to work with ACNS:

- Ashley Carey (Flinders University)
- Lillian Caruana (University of New South Wales)
- Celia Chen (University of Sydney)
- Ada Fang (University of Sydney)
- Charlotte Frost (Queensland University of Technology)
- Timothy Nisbet (University of Newcastle)
- Liam Pascoe (Australian National University)
- Kyle Portwin (University of Wollongong)

AINSE Post-graduate research awards

Congratulations to the following students who were granted a 2021 PGRA scholarship from AINSE to work with ACNS, for up to the next three years:

- Jackson Allen (University of Wollongong)
- Andrew Braz (University of Sydney)
- William Davids (University of Sydney)
- Nicholas Florent (RMIT)
- Senlin Gu (Deakin)
- Veena Kelleppan (Monash)
- Xiaofan Liu (University of Sydney)
- Michael Newton-Vesty (University of Canterbury)
- Arslan Siddique (UNSW)
- Nicholas Stapleton (University of Western Australia)
- Alice Tiong (Monash)
- Nisal Wanasingha (RMIT)
- Zixi Xie (University of Sydney)

AINSE Early Career Research Awards

Congratulations to holders for the recently announced AINSE ECRG grant holders, seven of whom will be working on projects in partnership with ACNS:

- Saffron Bryant (RMIT)
- Shinji Kihara (University of Auckland)
- Teng Lu (Australian National University)
- Aiswarya Pradeepkumar (University of Technology Sydney)
- Lei Qin (UNSW)
- Joshua Willott (University of Newcastle)
- Qingbo Xia (University of Sydney)

Issue 5 | September 21

Scatter Matters

Supported by NCRIS National Research Infrastructure for Australia An Australian Government Initiative

ANI awards

We are pleased to award our first ACNS and NDF Impact Awards (otherwise known as the ANIAs). Entry was open to all who have participated in an ACNS and/or NDF proposal over the last three years, allowing us to find out more about the wider impacts of research enabled by the Australian Centre for Neutron Scattering and the National Deuteration Facility. Entries were judged by representatives across ANSTO – Dr Rob Acres (NISE), Dr Karyn Jarvis (ANBUG), Ms Susan Bogle (ANSTO Communications), Prof Garry McIntyre (ACNS) and Dr Anthony Duff (NDF).

Voucher are awarded to those judged to be best in each National Science Research Priority area, and go to:

- Taposh Roy Transport
- Meltem Bayrak Food
- Dongxu Li Advanced Manufacturing
- Leonie van 't Hag Health
- Chris Mays Environmental Change
- Shima Taheri Soil and Water
- Wei Kong Pang Energy

With no entries this year in the resource or cybersecurity categories, there is lot to think about for next year's competition. Thanks so much to all that entered, we hope that all entries will be used going forward to develop case studies to report the impacts to our funding agencies. Those whose content are proposed for use in such a way will be contacted beforehand and invited to review how the content has been edited.

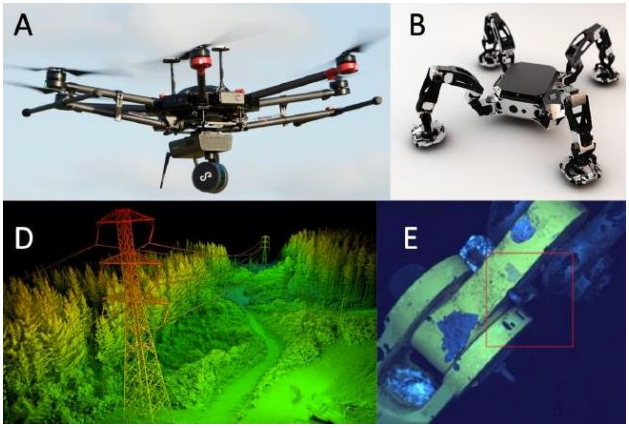
Grant successes

ACNS scientists, partnering with our user community, have been successful on a number of grants since the last Newsletter. These include:

ARC Industrial Transformation Training - Centre for Facilitated Advancement of Australia's Bioactives (IC210100040)

Hosted by Macquarie University, ANSTO is one of 14 partners that will work to apply advanced methods to characterise the molecular identity of bioactives, (and their bioavailability), providing scientific evidence for their positive impact on health, enabling consumers to make more informed choices when purchasing products with health benefit claims, and supporting the development of regulatory frameworks. Prof Elliot Gilbert is leading the ACNS contribution to this centre.

ARC Research Hub - Intelligent Robotic Systems for Real Time Asset Management (IH210100030)



Led by University of Sydney, this hub aims to transform the way assets and infrastructure are managed by developing new capabilities for intelligent robotic systems for inspection, monitoring, and maintenance.

Prof Anna Paradowska & Mr David Filipetto lead projects in use of robotics both for nuclear medicine production and asset management in challenging conditions of decommissioning of nuclear reactors. Additionally, Anna will work on application of robotics to optimize neutron measurements at ANSTO

ARC Linkage Grant - Advanced framework materials for hydrogen storage applications (LP200301563)

Hydrogen production and storage has been identified by the Australian Government as a strategic priority within the energy sector but one of the key technological challenges in this area its safe and efficient storage.

Research led by Prof Cameron Kepert and associates at the University of Sydney and A/Prof and ARC Future Fellow Suzanne Neville at UNSW is based on an interdisciplinary approach that targets the synthesis and detailed characterisation of two classes of molecular framework materials particularly well suited for the efficient storage and delivery of hydrogen gas.

Importantly, the linkage grant funds the development of an advanced hydrogen delivery canister by industry partner Rux Energy Pty Ltd.

Prof Vanessa Peterson, leader of the Energy Materials Research Project at ANSTO who has worked extensively in characterising materials for energy production and storage for over a decade using neutron scattering instruments, will contribute to the project as a partner investigator.

Event Reports

AINSE Winter School

The Australian Institute of Nuclear Science and Engineer (AINSE) Winter School 2021 was hold online via Zoom from the 5th to the 9th July. More than 70 undergraduate students from universities all around Australia and New Zealand attended this school. Following the tradition of the AINSE winter school, overviews of the different research themes and infrastructure capabilities at ANSTO were given by the Leaders of the different themes and facilities. Jamie Schulz, the Leader of Australian Centre for Neutron Scattering (ACNS), gave a wonderful introductory talk about ACNS to the students in the school on the Tuesday, 6th July.

In the following days, the facility sessions held by ACNS, Australian Synchrotron (AS), etc. gave more detailed introductions to the techniques available at these facilities to the students. This year's facility session for ACNS, which was organized by Dr. Guochu Deng, one of the instrument scientists on the triple-axis spectrometers at ACNS, was successfully held on the 8th of July, with the strong

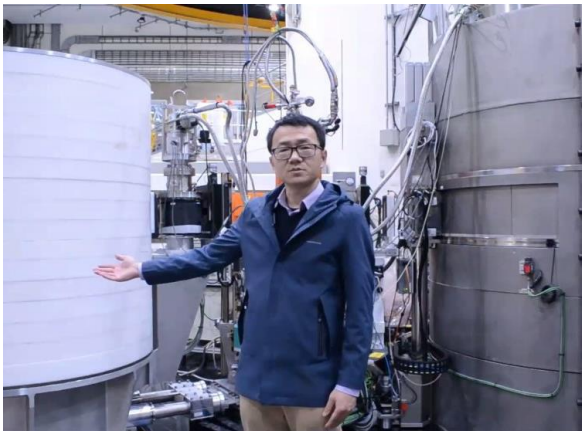
support from Dr Richard Mole and Prof Garry McIntyre who helped field questions via the online chat channel.

Other instrument scientists from ACNS, including Dr. Stephen Holt, Dr. Andrew Whitten, Dr. Joseph Bevitt, Dr. Mark Reid, Dr. Rachel White, Dr. Alison Edwards and Dr. Jitendra Mata, described the neutron scattering techniques of reflectometry, small-angle neutron scattering, neutron imaging, strain scanning, sample environment, and neutron diffraction. Guochu gave a brief introduction to the inelastic-neutron-scattering technique, followed by a practical session, which demonstrated how to conduct an inelastic-neutron-scattering experiment on the triple-axis spectrometer, Sika.

Several of the presentations were pre-recorded, which are proving to be a very useful resource for such schools. The students were highly interested in all varieties of neutron scattering techniques and the science produced, especially the fossil imaging and high-temperature superconductors.

On the following day, many students attended the neutron-scattering session of the round-table discussion. Alison, Richard, Guochu, Joseph and Mark participated in the round table discussion with those students. Quite a few students showed their keen interests in some specific neutron techniques and are likely to make direct contact with our instrument scientists for their research projects and potential collaborations.

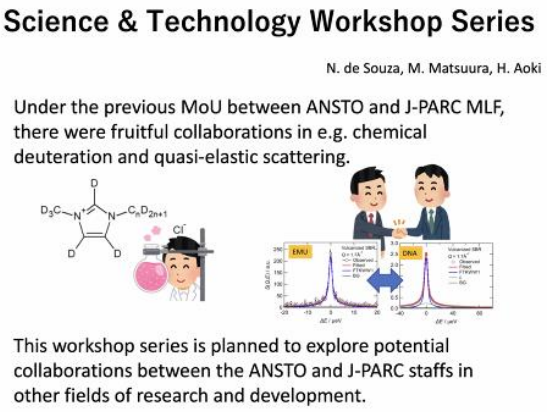
Dr Michael Rose and Ms Laura Owen of AINSE, who were responsible for the overall planning and organisation of the Winter School, provided excellent technical assistance.



The AINSE Winter School 2021 was a very successful school, which opens a new horizon to all the participants about the advanced science and technologies at ANSTO, and plants a seed in these young minds and potential future scientists, which will sprout, grow and blossom one day in the future.

Dr Guochu Deng

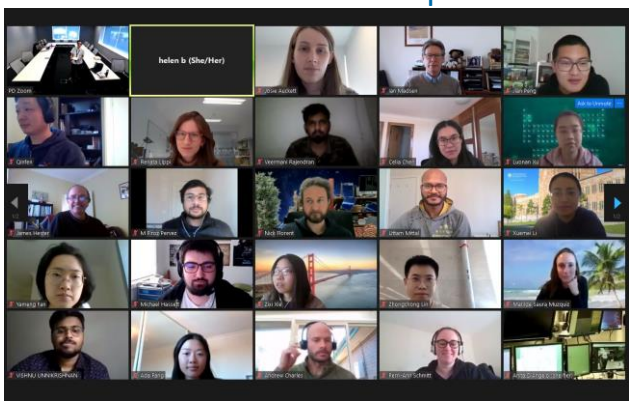
ANSTO/J-PARC MoU Signing Celebratory Workshop



In 2020 ANSTO re-signed its memorandum of understanding with J-PARC, and critically for our neutron scattering horizons this now includes the Comprehensive Research Organization for Science and Society (CROSS). In celebration of the signing a

joint workshop was held on the 30th July and attended by, among others, ANSTO CEO Shane Jenkinson and J-PARC director Takashi Kobayashi. The workshop allowed the leaders of ACNS, the Materials Life Science Facility (MLF), CROSS, NDF and Japan Atomic Energy Authority (JAEA) to share their capabilities and hopes for the future. Part of the workshop was the discussion of the forthcoming Science and Technology Workshop Series – which will be a series of workshops on neutron scattering techniques.

Powder diffraction workshop



The joint Australian Synchrotron and Australian Centre for Neutron Scattering Powder Diffraction analysis – a workshop for beginners was held 17-19th August 2021 through Zoom. The 10-year anniversary of the event saw 30 participants being guided through analysis of data from our facilities. In a new initiative, by this year's organiser Dr Anita D'Angelo, two early career researchers, Dr Mathilde Saura-Múzquiz and Dr Jack Binns, also gave talks on how they are using powder diffraction data in their work.

Upcoming Events

Small-angle workshop

The small-angle-scattering groups at the Australian Synchrotron and ACNS will be running a joint workshop on analysis of small-angle-scattering data in the first week of December this year with both practicals and lectures. The main organiser is Dr Christina Kamma Lorger and we will soon be opening applications – keep an eye out for this!

ANSTO User Meeting

As mentioned in the ANBUG news, this year will see a hybrid online ANSTO User Meeting 24-26th November – with the hope for local hubs for people to meet up.

The Invisible Revealed

Exhibition, Powerhouse Museum, from the 12th November 2021 until the 6th March 2022.

Mark this date to catch the results of a fabulous collaboration. Images from the Dingo instrument

are to be included in a new exhibition at Sydney's Powerhouse museum. This exhibition will illustrate the discoveries of these age-old artefacts made using ANSTO's scientific instruments by presenting a selection of the original artefacts alongside computer-generated 3D (tomographic) visualisations and other imagery that reveal their structural secrets.

International Conference on Neutron Scattering (ICNS2022)

Save the date: 21st-25th August 2022! ICNS 2022 will be the 12th conference in a series held every four years starting in 1982. ICNS 2022 will be the largest international platform for sharing and exchanging the latest exciting advances in neutron scattering science, including a broad range of topics.

Applying for Instrument time

For submission advice see the website or contact the ANSTO NSW User Office team on:

T: +612 9717 9111

E: user.office.nsw@ansto.gov.au

Powder Diffraction & Small-Angle Neutron Scattering Mail-in Rounds

Applications for mail-in powder diffraction measurements on Echidna and small-angle neutron scattering measurements on Quokka are continuously open.

2022-1 Proposal Round

As mentioned in earlier in the newsletter, continuing disruption from the current COVID restrictions means we will only run one proposal round for instrument time in 2022. Applications for instrument time for the Australian Centre of Neutron Scattering and for access to National Deuteration Facility experiments for 2022 are now open. The call for proposals will close on 15th February 2022 at 11:59pm (AEST).

Meet the new team members

Please join us in welcoming the new members of the Australian Centre for Neutron Scattering team

Nardean Eskander

ACNS Laboratory Technician

Greetings, my name is Nardean Eskander. I have had the privilege of working at ANSTO for over a year, as a Health Physics Surveyor, ensuring Radiation Protection across site.

I graduated at the University of Wollongong with a Bachelor in Science with a Major in Medicinal Chemistry. I have always had a passion in contributing to the betterment of our society through science, research and development.

I feel fortunate to be able to be contribute by being a small part in the ACNS team."

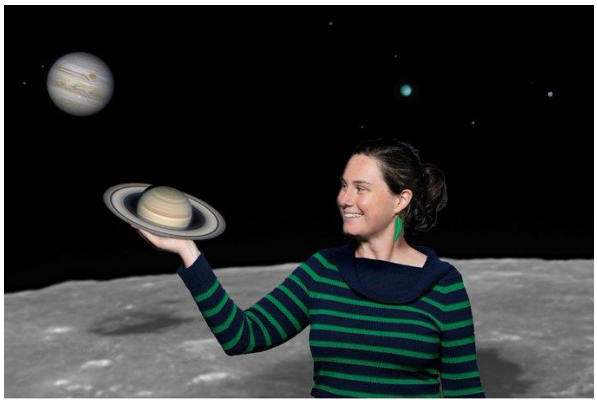
Scatter Matters

Supported by NCRIS National Research Infrastructure for Australia An Australian Government Initiative

The lighter side of neutrons

What does an instrument scientist do when he/she cannot access their instrument during lockdown? Why, build it out of LEGO of course! Dingo scientist Dr Joseph Bevitt worked in collaboration on a LEGO Dingo instrument with Andreas Bevitt (aged 3) and Jacob Bevitt (aged 6).

Contact us



Scatter Matters is edited by Dr Helen Maynard-Casely, who chairs the ACNS Outreach & Promotion Committee and likes cake. If you have a story or event you would like to share with the ACNS user community, get in touch - helenmc@ansto.gov.au