



FROM THE DIRECTOR: HELP FROM OUR FRIENDS

Users and other visitors to the Australian Synchrotron often tell us how much they appreciate the effort that staff put into answering all manner of questions.

What they also benefit from but don't necessarily see is the time put in by members of various unpaid committees that support the synchrotron in different ways.

For example, each beamline has a proposal advisory committee (PAC) that assesses user applications for beamtime and decides who gets beamtime and how much. Selecting the best science that can be done here is a challenging task, but the PACs do it very well.

Another essential group is the User Advisory Committee chaired by Roland de Marco from Curtin University. The UAC is an independent group charged with advising the synchrotron on issues from a user perspective.

We draw on the expertise of prominent local and overseas experts through the Science Advisory Committee (SAC) and Machine Advisory Group (MAG). SAC provides advice on our current and future scientific programs in terms of their quality and relevance to the Australian scientific community. MAG advises us on issues and developments that will help maintain and enhance our light source operations.

To find out more about the important roles fulfilled by our committees, visit the 'Governance and committees' webpages on our website:

<http://www.synchrotron.org.au/index.php/about-us>



Machine Advisory Group members with AS staff. L-R: Dean Morris, Greg LeBlanc, Eugene Tan, Erhard Huttel (MAG), Jeff Corbett (MAG), Mark Boland and Mikael Eriksson (MAG).

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UP TO SPEED

This month our short interview features Melodie Aitken, tours coordinator at the Australian Synchrotron.



Describe your job in 25 words or less.

Visitors, visitors and more visitors. If someone wants to visit the facility they contact me to arrange the details.

Best aspect of your job?

People's excitement and amazement when they learn what we do here.

Worst aspect of your job?

I can't bring my dog Rocky to work!

Apart from the Australian Synchrotron, what's the coolest job you've ever had?

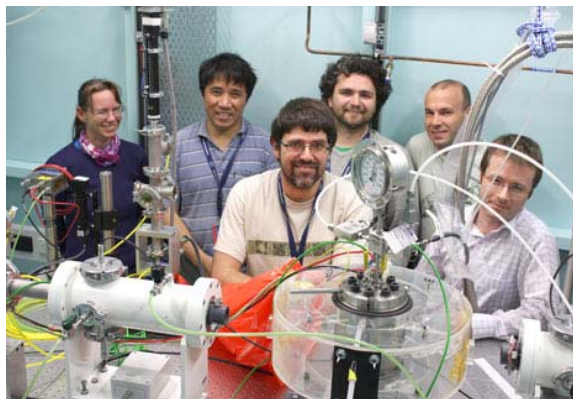
Working at Melbourne Zoo. I got to go



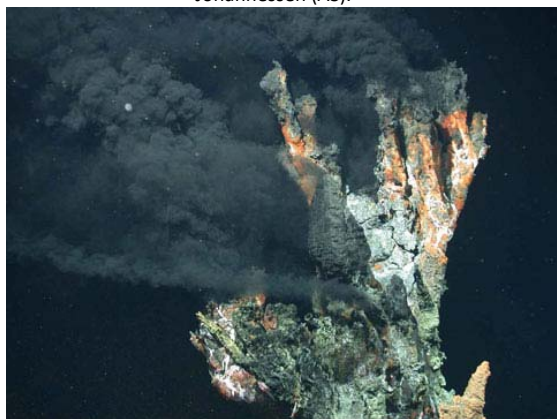
USERS CREATE HELL FOR SYNCHROTRON

Many of Australia's rich ore deposits were created billions of years ago in hellish conditions: highly toxic chemical brews heated to 400-500 °C and up to several thousand times atmospheric pressure.

Similar conditions are found today on the ocean floor about three or four kilometres down, where hot springs called 'black smokers' form metal-rich 'chimneys' and sediments.



L to R: Barbara Etschmann (UA), Weihua Liu (CSIRO) Joël Brugger (UA), Stacey Borg (CSIRO), Chris Glover (AS) and Bernt Johannessen (AS).



Hot springs ('black smokers') on the ocean floor operate at temperatures and pressures similar to those associated with the formation of ore deposits many millions of years ago.
Source: www.marum.de

Knowing the chemistry behind ore-forming reactions helps the minerals industry develop more effective exploration techniques and mineral processing methods. Recreating the extreme conditions is difficult, but studying the reactions themselves is even harder.

A collaborative team from The University of Adelaide (UA) and CSIRO, led by Associate Professor Joël Brugger and Dr. Weihua Liu, have built a specialised high-temperature, high-pressure sample environment for use on the x-ray absorption spectroscopy (XAS) beamline at the Australian Synchrotron. XAS is ideal because it can provide information on solubility and structure at high temperatures and pressures.

Christened mAESTRO for Australian Extreme SpecTROscopy, the team's autoclave was built in collaboration with the CNRS, France's national scientific research agency, based on a similar system developed for the European Synchrotron Research Facility.

In October 2009, Joël and his Australian colleagues spent a week at the synchrotron setting up and commissioning their highly specialised equipment.

"It took us a long time to reach this stage, with all sorts of safety issues to address as well as the scientific ones," Joël told *Lightspeed*. "However, it's easier than building a synchrotron on the seafloor – and our early results are very promising.

"We're looking forward to bringing mAESTRO back again for some more high-pressure beamtime at the Australian Synchrotron next year."

More: <http://www.synchrotron.org.au/index.php/aussyncbeamlines/x-ray-absorption-spectroscopy/users-create-hell-for-synchrotron>

'behind the scenes' with animals such as orang-utans, elephants and meerkats.

Best things about living in Melbourne and why?

I love travelling, but it's always good to get home to see my family and friends in Melbourne.

Your favourite overseas destination and why?

Syria and Jordan: amazing cultures and amazing people. Camping under the stars with the local Bedouin people was a truly unforgettable experience.

A little-known fact about the Australian Synchrotron?

The grounds have resident gnomes who keep a watchful eye over the facility.

What is the biggest challenge for tours at the Australian Synchrotron?

As demand for tours increases, moving more groups around the technical floor is always a challenge.

What do you think is the most important or interesting aspect of the Australian Synchrotron overall?

As science advances, the Australian Synchrotron needs to advance as well. We have a great team here to ensure we continue as a world class facility.

What is the funniest or strangest question a tour group has asked you about the synchrotron?

What will happen if I stand in front of the beam? 🦄

BEAMTIME APPLICATIONS

Beamtime submissions for January – May 2010 (round 2010/1) closed on 7 October 2009. Users will be notified in early December.

Key dates for beamtime submissions are listed on the new synchrotron website here:

<http://www.synchrotron.org.au/index.php/features/applying-for-beamtime/2009-2010-proposals-schedule>

If you would like to discuss your ideas for future beamline proposals with the beamline scientists at the Australian Synchrotron, please allow plenty of time.

AUSTRALIAN SYNCHROTRON DEVELOPMENT PLAN - UPDATE

Twenty-two individual projects of varying scope have been lodged with the Australian Synchrotron Development Plan (ASDP) team and are available for download from the ASDP Projects page:

<http://www.synchrotron.org.au/index.php/about-us/australian-synchrotron-development-plan/projects>

So far 325 people have formally registered interest in at least one of the projects and many others contributed to the submissions. The geographic, institutional and scientific diversity of participants augurs well for the continued development of the AS and the growth of synchrotron radiation-based science in Australia and New Zealand.

The 22 project submissions are currently undergoing internal review by AS management and staff with the goal of presenting a suite of high-quality, scientifically-justified proposals to the synchrotron's Science Advisory Committee (SAC). The submissions will then be reviewed by international experts. Feedback from SAC and the international reviewers will guide preparation of the ASDP document in early 2010 and enable us to prioritise the projects to be pursued.

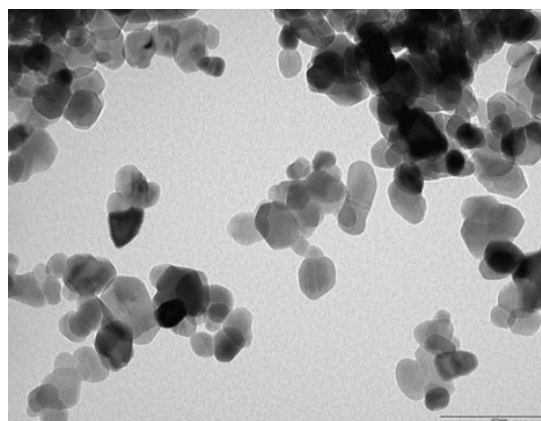
We will continue to keep the synchrotron community abreast of further developments in coming months.



SYNCHROTRON RESEARCHERS THINK SMALL

Sunscreens, plastics and paints often contain zinc oxide nanoparticles, which protect skin and other surfaces from harmful ultraviolet rays. The advantage of nanoparticles is we can't see them on our skin, unlike larger particles that appear white.

In response to claims that nanoparticles of zinc oxide could increase the risk of sunlight damaging the skin if they were absorbed into the skin, Australian



Electron micrograph of zinc oxide nanoparticles.
The scale bar is 100 nm.

researchers are using synchrotron techniques to explore the detailed toxicology and reactivity of zinc oxide. Their main aims are to help ensure that zinc oxide nanoparticles are safe for humans and the environment, and that legislation governing nanoparticle use is based on accurate science.

Melbourne scientist Terry Turney is working with

industry, CSIRO, Monash, RMIT and Deakin Universities and medical researchers to determine the long-term impact of zinc oxide nanoparticles in sunscreens.

Terry is looking at how introducing very small quantities of cobalt or manganese atoms (inside the nanoparticles or on the surface) might influence zinc oxide nanoparticle properties. The position and number of the cobalt or

For more information about applying for beamtime at the Australian Synchrotron, contact the User Office: user.office@synchrotron.org.au



EVENTS DIARY

EVENTS IN AUSTRALIA

BSR/MASR 2010

15-18 February 2010

Melbourne Convention and Exhibition Centre

BSR 2010 session themes include protein structure and function, biomaterials, spectroscopic techniques and non-crystalline diffraction.

More: www.bsr2010.org

MASR 2010 session themes include x-ray imaging, radiology, dosimetry and radiation biology, oncology, and pathology and diagnostics.

More: www.masr2010.org

Early bird and abstract deadline is 27 November 2009. Sponsored by Monash University Centre for Synchrotron Science and CSIRO.

EVENTS OUTSIDE AUSTRALIA

For additional information and listings, see

www.lightsources.org/cms/?pid=1000068

4th Asia-Oceania Forum on Synchrotron Radiation Research

30 November – 1 December 2009

Shanghai Synchrotron Radiation Facility (SSRF)
Shanghai, China

AOFSRR enhances intercommunication and collaboration among synchrotron radiation facilities in Asia-Oceania and enables information exchange with other regional organisations or worldwide societies of synchrotron radiation research.

More:

<http://www.sinap.ac.cn/aof2009/>

VUVX2010

11-16 July 2010

University of British Columbia
Vancouver, British Columbia, Canada

The 37th International Conference on

manganese atoms can be controlled by modifying the manufacturing conditions.

“Using the synchrotron, we’ve finally been able to obtain precise structural details of our relatively large nanoparticles (20-30 nm),” Terry says. “Medical researchers are now correlating that data with chemical and biological reactivity studies.”

More:

<http://www.synchrotron.org.au/index.php/news/publications/australian-synchrotron-case-studies/australian-synchrotron-stories/382-synchrotron-researchers-think-small>



OPEN DAY 2009

The Australian Synchrotron welcomed 2258 visitors during our Open Day on Sunday 25 October.

With the synchrotron beam turned off, but with public interest definitely switched on, people from across the community had a unique opportunity to peek behind the scientific scenes. Most visitors set their own pace on self-guided tours that covered the basics of synchrotron science and its real-world applications.

Synchrotron scientists and their supporters fielded questions including: “Is the synchrotron’s light created by plutonium?” (No); “Are you planning to capture the rainwater from your big roof?” (Yes); “Was this building really meant to look like a giant traditional Australian corrugated iron water tank?” (Possibly); and “Can I build one of these at home?” (Probably not. But you could keep your eye out for an electron gun and a linear accelerator on e-Bay).

For visitors with some degree of specialist knowledge, intensive accompanied tours featured accelerator physics, mechanical engineering, electrical engineering, IT & controls, and safety systems. Kitted out in lurid orange vests, tour guides and guests traversed the complex network of tunnels and walkways that crisscross the facility.

If all that became a little too much, visitors could resort to the Rotary Club of Clayton hospitality marquee, where funds raised were dedicated to the acquisition of a great disaster relief invention, the ShelterBox



Vacuum Ultraviolet and X-ray Physics will cover the development of synchrotron, laser, or plasma based sources of electromagnetic radiation in the vacuum ultraviolet (VUV), soft X-ray and hard X-ray regions, and novel applications of these sources in a variety of fields.

More: <http://www.vuvx2010.ca/>

11th SXNS Conference

14-17 July 2010

Northwestern University, Evanston (nr Chicago), Illinois, US

The Eleventh International Conference on Surface X-ray and Neutron Scattering is jointly organised by Northwestern University and Argonne National Laboratory. This biennial event brings together researchers studying surfaces and interfaces of solid, liquid, biological and soft matter via neutron or x-ray (either hard, soft, or EUV) scattering techniques.

More:

<http://www.sxns11.northwestern.edu/>

SPIE Optical Engineering + Applications

1 - 5 August 2010

San Diego Convention Center
San Diego, California, US

This major symposium covers classical optical R & D, design, and engineering, as well as technologies and systems for use in optical systems, remote sensing, and illumination engineering. Events of interest to synchrotron scientists include the following two conferences.

Advances in X-Ray/EUV Optics and Components V (OP321)

Advances and emerging needs in x-ray and EUV sources, optics, and applications including next-generation synchrotron and free-electron laser sources, EUV photolithography, and x-ray astronomy.

Developments in X-Ray Tomography VII (OP323)

Interdisciplinary discussion of tomography. Scientists and engineers from medicine, biology, earth science, materials testing and development, crystallography, solid state physics, chemistry, micro-mechanics, and micro-devices will present their results and describe new strategies and components for tomography as well as

TOP RESULTS FOR TOP-UP WORKSHOP

A workshop on the accelerator physics of top-up operations was held at The University of Melbourne in October 2009.

Top-up is a mode of operating the storage ring that keeps the beam current constant to better than 1% by injecting a small number of electrons every few minutes rather than letting it decay by 25% every 12 hours. From a user's point of view, that means a more stable photon beam.

The workshop featured talks by physicists from light source facilities in Europe, Asia and USA that are running in top-up mode or plan to do so in future. In true workshop style, participants engaged in robust discussions about requirements, achievements, performance issues and areas requiring more research in order to run top-up successfully.

An excellent overview was given by Kouichi Soutome from JASRI/SPring-8, one of the most experienced and successful facilities to run in top-up mode. David Paterson from the Australian Synchrotron's XFM beamline gave a talk highlighting the benefits of top-up to his research program. The workshop's success has led to calls for another workshop in the near future to report on the progress of new facilities moving to top-up.

All Top-Up Workshop talks are available for download at <http://topup.synchrotron.org.au>



Machine Advisory Group member Jeff Corbett (left) from SSRL discusses the finer points of top-up with Prof Geoff Taylor from the School of Physics at The University of Melbourne.



MORE INFORMATION


A list of Australian Synchrotron personnel can be found www.synchrotron.org.au/index.php/about-us/working-at-the-synchrotron/staff-contact

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Clayton, Vic 3168

Within Australia:

 03 8540 4100

International:

 +61 3 8540 4100

new applications.

Deadline for abstracts for all symposium events is 18 January 2010.

More:

<http://spie.org/optical-engineering.xml>



READER FEEDBACK

Lightspeed welcomes your comments and suggestions. Please send these to:

info@synchrotron.org.au with 'Lightspeed comments' in the subject line.



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CAREERS AT THE AUSTRALIAN SYNCHROTRON

The Australian Synchrotron offers a unique working environment for a wide range of specialists. More information on job postings: www.synchrotron.org.au/index.php/about-us/working-at-the-synchrotron/employment-opportunities

