LIGHTSPEED

December 2011

Triple R broadcasting live at the Australian Synchrotron Open Day November 27th 2011. Story pg 6.

From the Director: Spreading the light

Keith Nugent, Director Australian Synchrotron

With the end of 2011 rapidly approaching, it's time to say thank you to the many thousands of people who have helped to make this such an amazing year for the Australian Synchrotron.

I recently had the privilege of meeting some of these people at two important events: the West Australian synchrotron symposium, which attracted a lively bunch of expert and potential new users, and the Australian Synchrotron's annual open day, which attracted 3000 enthusiastic visitors from across Melbourne who came prepared with questions about almost every aspect of our work.

I also want to thank the thousands of researchers who made a total of 3500 trips from around Australia, NZ and further afield this year to use our beamlines, the 700 high school physics students and teachers who conducted experiments in our education laboratory between August and October, the 120-plus synchrotron staff who continue to impress with their high professional standards and dedication to their work, and our government supporters, foundation investors, boards, committees, advisory bodies and many other groups and individuals too numerous to mention here without incurring the wrath of the newsletter editor. My heartfelt thanks to all of you for your support and encouragement.

My thanks also to the many people who have worked on the new buildings springing up around the main synchrotron building. The engineering building and the office extension pod are now fully operational. The imaging and medical beamline (IMBL) satellite building is complete and the transfer tunnel is being fitted out with the necessary equipment to extend the beam to its full 150 metre design length. The user accommodation building is being furnished and should be ready for occupation by April 2012, along with our new showpiece: the National Centre for Synchrotron Science.

To users who are reading this at the 2011 User Meeting, I can promise you a diverse program of thought-provoking presentations and plenty of opportunities for networking with synchrotron experts and potential new collaborators. To users who have been unable to attend the User Meeting, I can assure you that we will continue to extend and improve the information we provide on our website and in this newsletter as well as in many other ways.

And on behalf of the management and staff of the Australian Synchrotron, I wish all our readers the compliments of the season and a promising and productive 2012.

Australian Government

State Government Victoria

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Up to Speed
Peter Jones

This month our short interview features Peter Jones from the Australian Synchrotron's accelerator operations team.

Describe your job in 25 words or less?

Accelerator operators endeavour to keep electrons in the storage ring 24/7 during user runs, so the scientists, users and facility can achieve successful experimental outcomes.

Best thing about your job?

I learn something new and interesting about the synchrotron and its operation every shift, due to the large variety of tasks, functions and interactions we perform.

Worst thing about your job?

Sometimes it's hard to follow up things in a timely manner with other synchrotron staff as we work blocks of day and night shifts in a 24/7 shift environment. (Alternative answer: Not having a kitchen in the control room.)

Biggest challenge facing your team?

The physicists and operators are upgrading the synchrotron to run in top-up mode, so that 200mA of beam can be maintained in the storage ring on a 24/7 basis. Currently we refill the storage ring with electrons twice a day at 8 o'clock. As operators, we perform weekly top-up runs and testing during machine studies.

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

I worked as an electrician building nuclear submarines and warships.

Best things about living in Melbourne and why?

I worked as an electrician building nuclear submarines and warships.

Peter Jones

Living down the Mornington Peninsula, my family and I have easy access to the surf beaches. (Alternative answer: It has similar weather to my home town Barrow-in-Furness in the north west of England, hot one minute and wet the next, so it makes me feel at home.)

Your favourite overseas destination and why?

I always enjoy going to the Spanish islands of Majorca, Ibiza and Teneriffe for the warm weather and good fun. (Alternative answer: Blackpool because of the donkey rides, deckchairs and hanky chiefs on your head, what more could you want.)

A little-known fact about the Australian Synchrotron?

The control room is being upgraded with new PCs, monitors and furniture.

What's the funniest question you've ever been asked about your work at the synchrotron?

On open day last year, a member of the public asked me a question about the dipole (bending) magnets. After I answered his question, he went on to say how impressed but disappointed he was with my response, as he had been researching the answer prior to his visit and was pretty sure he would catch me out. Little did he know I had only been here for a couple of months and really did not have that good an understanding myself. What more can you say, another happy and satisfied member of the public.

L. **Peter Jones**
R **The Synchrotron**

Fighting cancer with selenium

Selenium is a dietary puzzle. If there isn't enough selenium in your diet, you're more likely to suffer from some forms of cancer. On the other hand, if there's too much selenium in your diet, you may suffer a range of adverse effects. The different chemical forms of selenium in the diet appear to play a big role in its impact on our bodies.

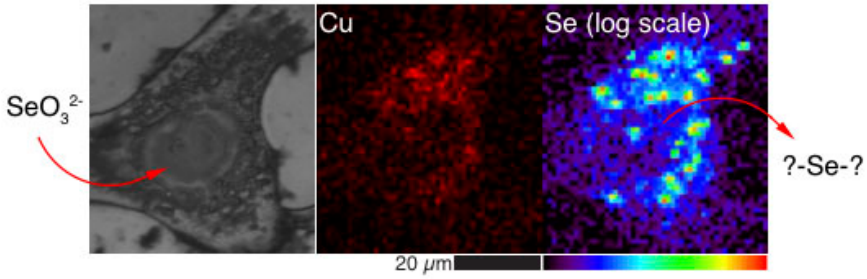
In October 2011, an international team led by Adelaide researchers revealed important new details of how selenium begins to fight cancer cells.

Hugh Harris and his collaborators used x-ray techniques at the Australian Synchrotron, and at overseas facilities through the synchrotron's international access program, to reveal what happens to selenium when it enters human lung cancer cells in inorganic selenite form.

Hugh and his colleagues found that the selenite was quickly taken up by cancer cells but then took a day or more to start killing them.

During the first 24-48 hours, the inorganic selenite is transformed through several intermediate forms into a different chemical form of selenium that indicates oxidative stress in the cancer cells. Oxidative stress is a major area of research into a number of diseases.

The synchrotron results also showed that lung cancer cells store selenium in specific areas that contain raised copper levels as well, which may indicate a link between the effects of dietary selenium and copper.



XRF elemental maps of human cancer cells treated with selenite show that selenium and copper are stored together in small compartments.

Images: Hugh Harris, University of Adelaide

The aim of the project is to learn how the chemical form of selenium changes over time in human lung cancer cells and use this information to assist the development of better ways to use selenium to treat human cancers while reducing the risk of adverse health effects.

Hugh and his University of Adelaide colleagues are doing this work in collaboration with researchers from the University of Sydney, Argonne National Laboratory in the US, and the Australian Synchrotron. The work is part of a broad, long-term investigation of selenium metabolism, storage, accumulation and general biology, and how selenium interacts in the body with other metals such as copper and iron.

At the Australian Synchrotron, the team used micro-x-ray absorption near edge structure (micro-XANES) and x-ray fluorescence microscopy (XFM) to identify the specific chemical forms of the selenium and where these were located within the cancer cells.

Visit the link below for more information about the group's October 2011 research paper in the Journal of the American Chemical Society. http://pubs.acs.org/doi/abs/10.1021/ja206203c

Visit the link below to read an earlier article about Hugh's work from Lightspeed June 2010.

http://www.synchrotron.org.au/index.php/news/publications/lightspeed-newsletter/lightspeed-articles/433-dietary-selenium-a-fine-balance

The Australian Synchrotron

Beamtime applications
2012/2 round

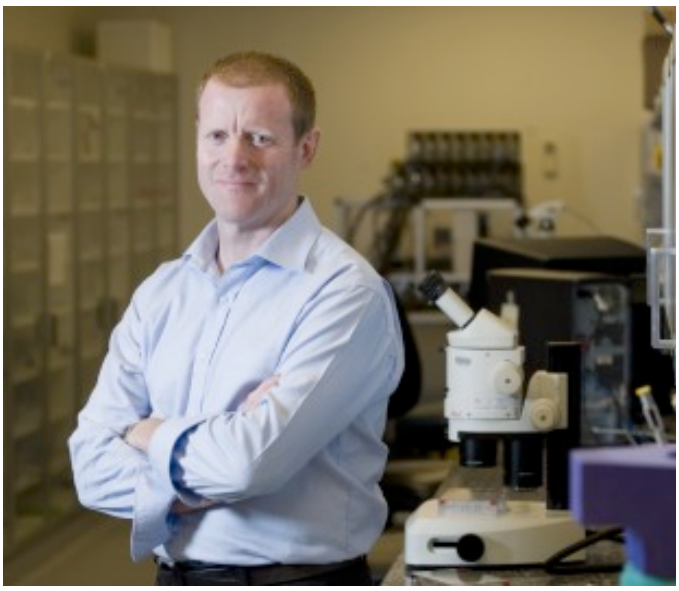
Beamtime submissions for round 2012/2 (May-August 2012) open on 13 December 2011 and close again on 15 February 2012.

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

http://www.synchrotron.org.au/index.php/features/applying-for-beamtime/proposal-deadlines

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.

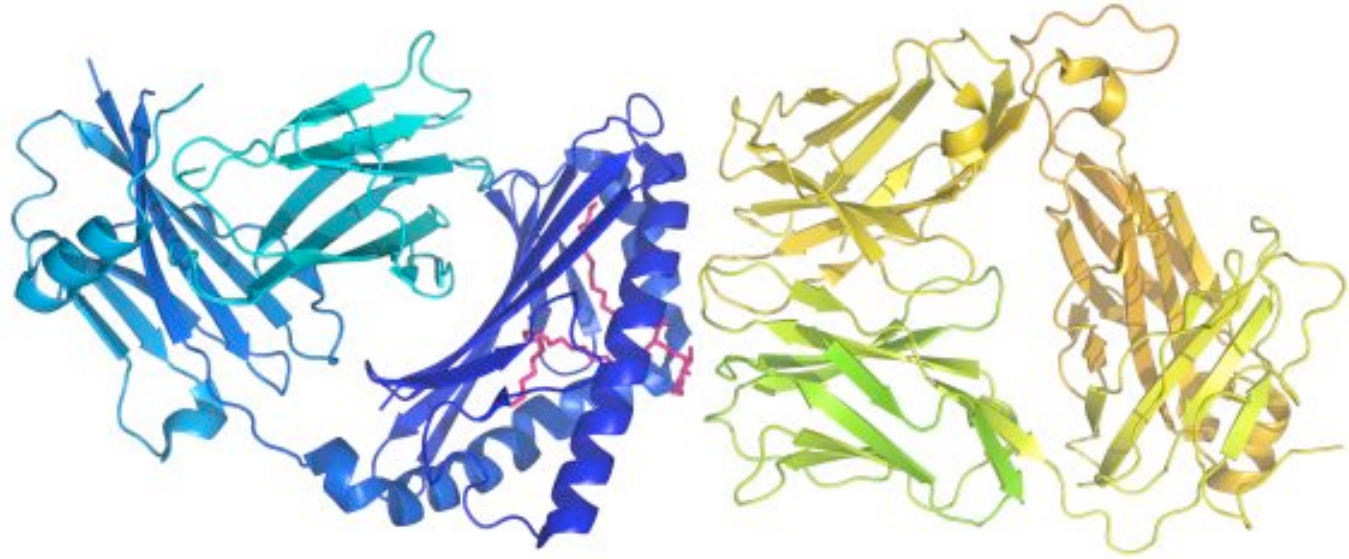
For more information about applying for beamtime at the Australian Synchrotron, contact the User Office: user.office@synchrotron.org.au



Below:
The newly discovered Vα10 natural killer T-cell bound to a glycolipid antigen (crystal structure of V(alpha)10-V(beta) 8.1 NKT TCR in complex with Cd1d- alphaglucosylceramide)

PBD code: 3RUG http://www.rcsb.org/pdb/explore/explore.do?structureId=3RUG

Left:
Professor Jamie Rossjohn



A killer new discovery

A new type of natural killer T-cell

T-cells are a key component of our immune system. Natural killer T-cells, also known as NKT cells, are implicated in a broad range of diseases and health conditions, including microbial immunity, tumour immunity, autoimmunity and allergy. While T-cells recognise peptide-based antigens such as foreign proteins, NKT cells recognise lipid-based (fat-based) antigens.

The discovery of this new NKT cell type within our immune system has important implications for our understanding of how NKT cells actually work and how we might use this improved understanding to combat immune diseases.

Melbourne University, Monash University and Peter MacCallum Cancer Centre researchers used x-ray crystallography at the Australian Synchrotron to determine key structural details of how the T-cell receptor found on the surface of NKT cells interacts with the lipid antigen that is presented by a molecule called CD1d.

NKT cells are traditionally divided into two groups according to the type of T cell receptor (TCR) found on the cell surface. It is the TCR structure that determines which kind of glycolipid antigens (foreign molecules such as the sugars that make up bacterial cell walls) they can recognise.

The new NKT cell type – Vα10 – identified by a research team headed by Dale Godfrey (Melbourne University), Jamie Rossjohn (Monash University) and Mark Smyth (Peter MacCallum Cancer Centre) is similar in some respects to previously characterised NKT cells, but differs in the way it recognises diverse glycolipid antigens.

The team worked with collaborators in the UK and US to determine the atomic structure of Vα10 in complex with a glycolipid antigen to gain insight on how this new cell type binds to glycolipid antigens.

The work was published in a highly-regarded international publication called Nature Immunology in June 2011. http://www.ncbi.nlm.nih.gov/pubmed/21666690

Synchrotron development plan update

The Australian Synchrotron is using reports compiled for phase 1 and phase 2 beamlines as a basis for developing conceptual design reports (CDRs). The facility is also providing information and feedback to allow other groups to develop CDRs; these include a proposal for new crystallography capabilities. CDRs are an important milestone in our continuing development and will help provide the detailed technical information required to assess and begin the build process for new beamlines. The first CDRs are scheduled for completion around the end of 2011, with the remainder early in the new year.

The technical aspects of the development of CDRs are being mediated by the Development Working Group, whose members are drawn from the AS, the Scientific Advisory Committee to the AS, and expert technical advisors. As part of the process of developing the CDRs, independent expert reviews of the technical approach chosen for each beamline are being undertaken in order to provide an additional assessment of the validity of the design approaches provided by the BSGs.

Kia Wallwork, the synchrotron's Principal Beamline Development and Operations Advisor, said the synchrotron was "delighted to have received such detailed reports from the beamline scoping groups".

"We're grateful to the beamline scoping groups and the synchrotron community for their ongoing support and invaluable contributions."

The synchrotron website provides further information on the AS development process, and answers to frequently asked questions.

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

Awards for synchrotron user

In October 2011, the prestigious 2011 Ramaciotti Medal for Excellence in Biomedical Research was awarded to Professor Michael Parker of St Vincent's Institute of Medical Research [http://www.svi.edu.au/] in Melbourne for work that has led to a breakthrough in a potential treatment for certain leukaemias and significant developments in the quest to treat Alzheimer's disease.

The Ramaciotti Foundations are collectively one of the largest private contributors to biomedical research in Australia, granting more than $51 million to research projects since 1970. Michael Parker previously received Ramaciotti grants in 2000, 2004 and 2007.

Michael also received the 2011 Lemberg Medal from the Australian Society for Biochemistry and Molecular Biology in March this year.

Michael's career spans more than 25 years. He has made major advances in the field of protein crystallography, determining protein structures that have provided the basis for designing drugs to treat serious diseases such as Alzheimer's, leukaemia and other cancers, and infections.

Michael's research group are regular visitors to the Australian Synchrotron, where they use x-ray crystallography to determine the three-dimensional structures of key proteins implicated in the diseases they are studying.

Interviewed earlier this year for a synchrotron feature article in Chemistry in Australia, Michael said that: "Pharmaceutical companies around the world see structural biology, particularly crystallography, as a mandatory part of drug development. The Australian Synchrotron has been absolutely essential for many of the drug development activities of Australian medical research institutes in collaboration with commercial companies such as Biota and with the CRC for Cancer Therapeutics. All major biotech and pharmaceutical companies actively developing drugs in Australia now use or aspire to use the Australian Synchrotron."

Long-term synchrotron user Michael Parker has received two prestigious awards this year. Photo courtesy of Michael Parker

ICALEPCS to be held in Melbourne

The Australian Synchrotron will host the world's largest conference for accelerator controls systems in Melbourne in 2015. Around 400 delegates are expected to attend.

The International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS) is a biennial series of conferences inaugurated by control system specialists from accelerator laboratories, fusion facilities, particle detector groups, and telescope facilities around the world. The first conference was held in 1987 in Villars-sur-Ollon (Switzerland), hosted by CERN. The 2011 event was hosted by the European Synchrotron Radiation Facility (ESRF) in Grenoble, France. ICALEPCS 2013 will be held in San Francisco, California, USA. http://www.icalepcs.org/

User Meeting 2011

Held this year at the Sebel Albert Park in Melbourne on Thursday 8 and Friday 9 December, this annual event provides information about our facilities and enables members of our user community to showcase their research and network with some of the best scientists in Australia. The AS user community comprises more than 3000 registered users with expertise across all areas of the physical and biological sciences, technology and industry.

http://usermeeting.synchrotron.org.au/

Open Day 2011 what happened!

The Australian Synchrotron's annual Open Day on Sunday 27 November 2011 attracted around 3000 visitors of all ages and many backgrounds. Activities throughout the day included two live-broadcast radio shows by Australia's largest community radio station (Triple R): Radiotherapy and Einstein A Go-Go featuring interviews with several synchrotron scientists, and a laser light display in the Imaging and Medical Beamline tunnel (currently under construction). School-age children visitors enjoyed completing the synchrotron 'passport' and quiz, and the ever-popular Tubby the Robot from the 2010 Open Day returned to entertain everyone from toddlers to retired engineers!

The shining light and main attraction of the day was the synchrotron, with scientists, engineers, physicists and machine operators all on hand to answer the many questions about how the machine works, the types of research and experiments undertaken and how the outcomes of synchrotron research affect our day-to-day lives. Those new to synchrotrons could attend a 'Synchrotron Science for Dummies' presentation to get a broad introduction to how the facility works and what it can achieve, while hands-on children's experimental activities gave tomorrow's scientists the opportunity to learn about light and science for themselves. Visitors with a background in science and engineering could attend specialist tours for a 'behind-the-scenes' look at how the synchrotron operates.

A very big thank you to everyone involved in our Open Day, including staff, volunteers and visitors. The event attracted around 3000 visitors, who enjoyed live radio broadcasts, introductory presentations, children's activities and in-depth tours – and asked lots of great questions.

"I feel proud to be a part of this nation with so many hardworking scientists," said one visitor. Many people commented on the friendly, approachable staff who did a great job explaining their work in terms that could be understood by everyone.

Visitors could take home a poster showing some of the Australian Synchrotron's 'greatest hits' – a collection of research outcomes that we encounter in our everyday lives. Click here to download a copy, or contact us and we can send one to you.

A very big thank you to everyone involved in our Open Day, including staff, volunteers and visitors. We look forward to seeing you again next year, and don't forget – our specialist tours, presentations and experiment sessions book out very quickly, so please keep an eye on our Lightspeed [http://www.synchrotron.org.au/index.php/news/publications/lightspeed-newsletter]e-newsletter and website for details of next year's event.

Open Day 2011

Iron work to boost rice diets

Despite being a major food source for billions of people in developing countries, particularly in Asia, polished or white rice does not contain enough iron, zinc or pro-vitamin A to meet daily nutritional requirements.

A new iron-enriched rice variety developed recently by Melbourne and Adelaide researchers could help solve iron deficiency problems that currently affect more than two billion people. According to the World Health Organisation, iron deficiency is the world's most common nutritional disorder.

The new rice variety has up to four times the iron content and twice the zinc content of ordinary rice grains.

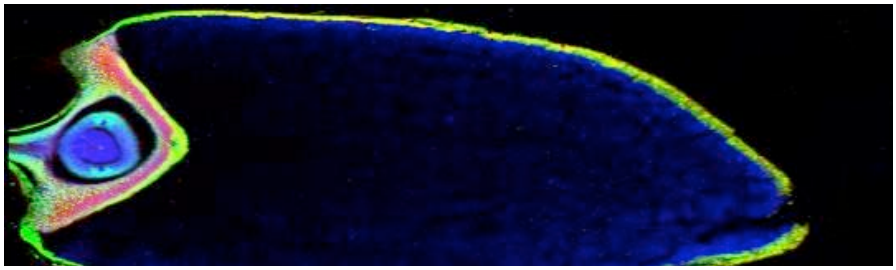
A scientific team from the Australian Centre for Functional Plant Genomics [http://www.acpfg.com.au/] produced the mineral-rich rice variety using gene technology to increase the amount of iron transported into the endosperm, the part of the rice grain that most people eat.

"Rice doesn't exhibit a lot of genetic variation for iron accumulation in grain, and this has hindered conventional breeding programs trying to increase iron levels in rice," says Alex Johnson from the ACFPG team. "These programs have been unable to match the iron levels we've achieved in our glasshouse experiments. We've produced the world's first greenhouse-grown rice plants to exhibit such high levels."

The researchers used the Australian Synchrotron to investigate the distribution of iron, zinc and other minerals in the rice grains, particularly the endosperm. The x-ray fluorescence microscopy beamline, which features the award-winning Maia detector, can produce detailed maps of elemental distribution at resolution down to sub-micron levels.

The team that developed and analysed the iron-rich rice is based at the universities of Melbourne, Adelaide and South Australia. They announced their achievement in a scientific paper published in a major online peer-reviewed journal, PLoS ONE, in September 2011.

http://dx.plos.org/10.1371/journal.pone.0024476



XFM image of potassium, iron and copper distribution in a rice grain. Image: Alex Johnson (University of Melbourne) and Enzo Lombi (University of South Australia)

Following the team's success in growing their iron-rich rice plants in a greenhouse environment, the next stage of the project involves conducting field trials in the Philippines in collaboration with the International Rice Research Institute. The aim of the trials is to demonstrate that the rice grows well and takes up enough iron and zinc in a field environment to maintain the enriched levels in the endosperm.

We're 99 percent available

Machine availability is a measure of the reliability of a synchrotron in providing beam for users. At the Australian Synchrotron we define this as the amount of beamtime we actually delivered from the machine as a proportion of the amount of beamtime we scheduled over the past four months.

In slightly more technical terms, machine availability is a product of 'mean time between failures' or MTBF (a failure being an unscheduled beam loss) and 'mean down time' (when there is a beam loss, how long it takes us to get back up and running again). This is the primary indicator of machine performance in synchrotron light sources. Most facilities target, but don't always achieve, machine availability figures above 95 percent, and the best in the world typically sit in the range 98-99 percent.

Our facility has consistently had extremely high availability since we began user operations in 2007, achieving figures in excess of 98 percent for the past four years. In November 2011 we hit our highest machine availability ever, achieving 99.1 percent. This is a testament to the great work of our engineers and physicists for constantly working to make the machine more reliable, and to the technicians and operators who maintain and repair the machine and spring into action to fix it when there is a fault.

Congratulations to 2011 AS thesis medal winners

The winners of the 2011 Australian Synchrotron Thesis Medal are Dr Kaye Morgan and Dr Corey Putkunz, who completed their PhD studies at Monash University and La Trobe University respectively.

The Australian Synchrotron Thesis Medal is awarded annually to the PhD student at an Australian or New Zealand University who is judged to have completed the most outstanding thesis of the past two years - and whose work was undertaken at and acknowledges the Australian Synchrotron, or the Australian National Beamline Facility (ANBF), or whose work acknowledges and was undertaken under the auspices of the International Synchrotron Access Program (ISAP) or the ASRP.

L-R: Santosh Panjikar (AS) and Nausad Shaikh (IMB) put the AutoRickshaw decision-making system to the test in November 2011, solving a protein structure in just 18 minutes

AutoRickshaw at your service
a crystallographer's dream come true

Despite being unable to make cups of coffee or arrange pizza deliveries, AutoRickshaw is a crystallographer's dream come true, solving crystal structures within minutes of data collection.

Solving even the most-straightforward crystal structure typically involves half-a-dozen software packages and a series of carefully-considered decisions. Now Australian Synchrotron users can call on the services of AutoRickshaw, an integrated, automatic decision-making system that evaluates the dataset, decides which software programs to use, works out any problems that arise during structure-solving, and then produces a three-dimensional computer model. AutoRickshaw even offers advice about additional actions that may be required if the data are not good enough to produce a sensible crystal structure.

"It's really a 'virtual crystallographer'," says Santosh Panjikar, a macromolecular crystallography expert who developed AutoRickshaw with his colleagues at the European Molecular Biology Laboratory (EMBL) in the early 2000s. "It works on the principles of 'as good as necessary, as fast as possible'."

Now working at the Australian Synchrotron, Santosh has deployed the full AutoRickshaw system here – with the added advantage of the supercomputing power of the MASSIVE high-performance computing facility recently launched at Monash University and the Australian Synchrotron.

"With MASSIVE, it's a much faster, streamlined process," Santosh says. "Users can check their structures while they're here rather than waiting until they get home to find out whether their data are good enough."

AutoRickshaw passed its first user test in November 2011 when it took just 18 minutes to solve the structure of a protein crystal brought to the AS by Nausad Shaikh from Professor Glenn King's laboratory at the Institute for Molecular Bioscience, University of Queensland. Nausad is part of a team looking at bacterial proteins that could act as potential drug targets. His focus is a bacterial kinase, a type of protein that plays an important role in controlling cell behaviour. This particular kinase is only found in bacteria and not in higher organisms, making it a ideal drug target.

"We knew within one or two minutes that we would actually get a useful structure," Santosh says. "Nausad was still collecting data when AutoRickshaw came up with the result."

AutoRickshaw is available on the synchrotron's two macromolecular crystallography beamlines, although Santosh says users will first need to learn how to use it. He plans to write a small manual for users and add AutoRickshaw's graphical user interface (GUI) within the VBL system. The system will also be integrated so that when a dataset is good enough, it will automatically go into AutoRickshaw; if the data are not good enough, the system will alert the user to work on the dataset first before submitting it to AR.

More information is available from Santosh Panjikar.
http://www.synchrotron.org.au/index.php/aussyncbeamlines/macromolecular-crystallography/beamline-team/staff/dr-santosh-panjikar2

Bionic eye team looks at the synchrotron

The Monash Vision Group [http://www.monash.edu.au/bioniceye/index.html] is developing, testing and conducting human trials for a direct-to-brain bionic eye with the aim of testing their new device in at least one recipient by 2014. They estimate that up to 80 percent of clinically blind people could benefit from their bionic eye.

By integrating eye tracking with panoramic vision, the Monash Vision direct-to-brain bionic eye will provide a realistic view of surroundings. Eye-tracking sensors inside specially-designed glasses will sense when the eyes turn to the left or right, up or down, and a 'virtual' camera will pan to match, enabling eye control of bionic vision.

The Monash Vision consortium brings together engineering, computer scientists and medical researchers from Monash University and the Alfred Hospital in Melbourne, and Victorian companies Grey Innovation and MiniFAB.

Eight members of the Monash Vision team, including industry partners, recently visited the Australian Synchrotron to discuss ways that the team can incorporate synchrotron science into future research. For some in the group, including project leader Professor Arthur Lowery, it was their first visit to the Australian Synchrotron.

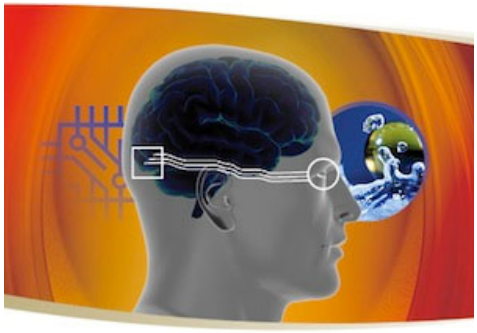
Monash Vision general manager Jeanette Pritchard was very pleased with the result.

By integrating eye tracking with panoramic vision, the Monash Vision direct-to-brain bionic eye will provide a realistic view of surroundings.

Monash Vision

"The combination of a round-table discussion with synchrotron staff in addition to the general tour was very useful," Dr Pritchard said. "This enabled us to gain a good understanding of the facilities that are applicable specifically for our project. Additionally to understand the mechanisms by which we can access the facilities and associated timeframes was very helpful."

A follow-up workshop is planned for early 2012 to explore in more detail how the Australian Synchrotron could play a role in this exciting project.



Bionic eye team with Australian Synchrotron staff

WA synchrotron symposium

In November 2011, a one-day synchrotron symposium at the University of Western Australia attracted more than 100 participants ranging from new students to experienced researchers. Participants came from UWA, Curtin University, Edith Cowan University, WA government departments of health and commerce, CSIRO, iVec and Alcoa.

The aim of the meeting was to inform, enthuse and attract new users, while also providing a forum for existing synchrotron users to get together and hear about each other's research.

Sessions on synchrotron applications in health and industry included presentations from David Parsons (Adelaide Women's and Children's Hospital) and Mel Lintern (CSIRO Minerals Down Under), as well as Andrew Peele and Keith Nugent from the Australian Synchrotron.

Other sessions focussed on the research of WA users in biological, materials and physical sciences (full program available at http://www.crystal.uwa.edu.au/px/charlie/wasun).

University of Western Australia Synchrotron Symposium

November 2011

Symposium organiser Charlie Bond from the UWA School of Biomedical, Biomolecular and Chemical Sciences said the format of the meeting worked well, "allowing those with a passing interest to stay for part of the day, while the hardcore synchrotron community stayed for the whole day".

AS head of science Andrew Peele said the symposium highlighted "the way that WA has used its foundation investor status to grow capabilities across all areas of research at the AS".

"There has been a clear effort to ensure that a wide array of methods are used – this has been reflected in the growth of new users and the spread of publications from WA researchers."

The meeting was funded by the WA Department of Commerce, UWA, Curtin University and the Australian Synchrotron.

Come up to the lab

Between August and October 2011, more than 650 physics students from 53 Victorian high schools participated in full-day laboratory sessions at the Australian Synchrotron, measuring electron beams, photoelectrons, laser diffraction and emission spectra.

The hands-on laboratory sessions support the (optional) synchrotron detailed study unit 'synchrotron and its applications' in the Victorian Certificate of Education (VCE) physics course and the 'interactions of light and matter' section of the central physics course. The sessions were conducted by the synchrotron's education and outreach officer Jonathan de Booy, a former high school physics teacher.

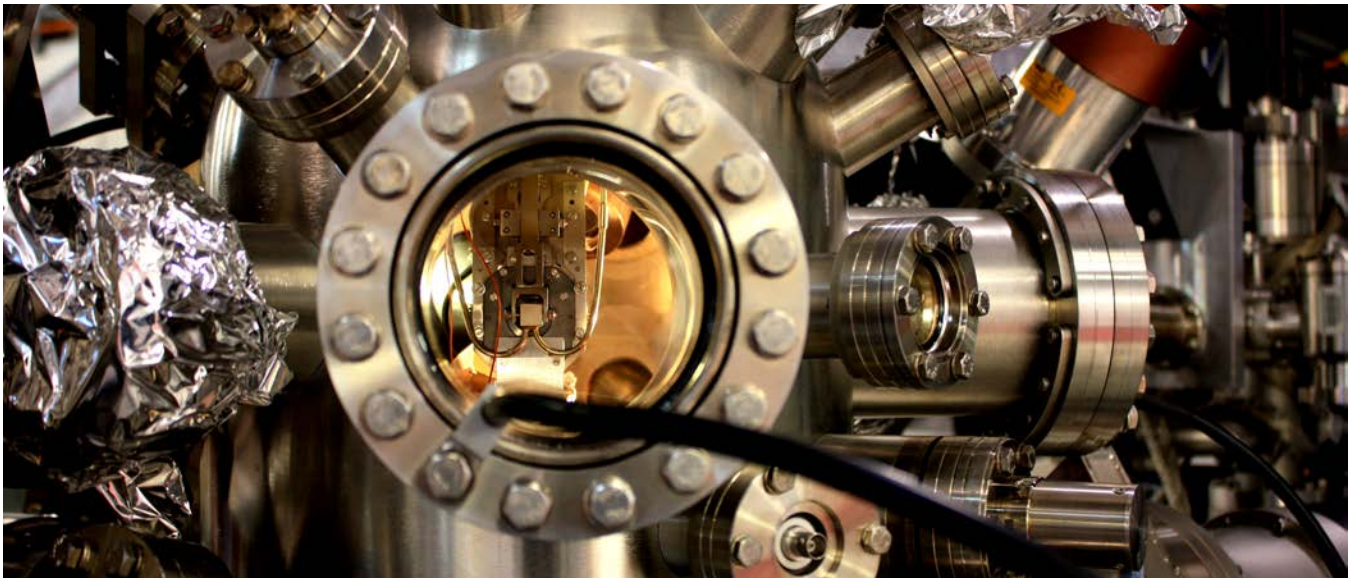
"Our education lab equipment mimics the synchrotron's x-ray equipment so we can offer more of a genuine user experience using visible light to demonstrate the same principles that apply to the x-ray equipment used here by researchers," Jonathan says.

Comments from physics teachers who have attended the synchrotron sessions with their year 12 students indicate that the lab sessions are widely considered of benefit to students. One teacher said that Jonathan's "explanations of physics concepts alone make this excursion essential for my year 12 physics classes".

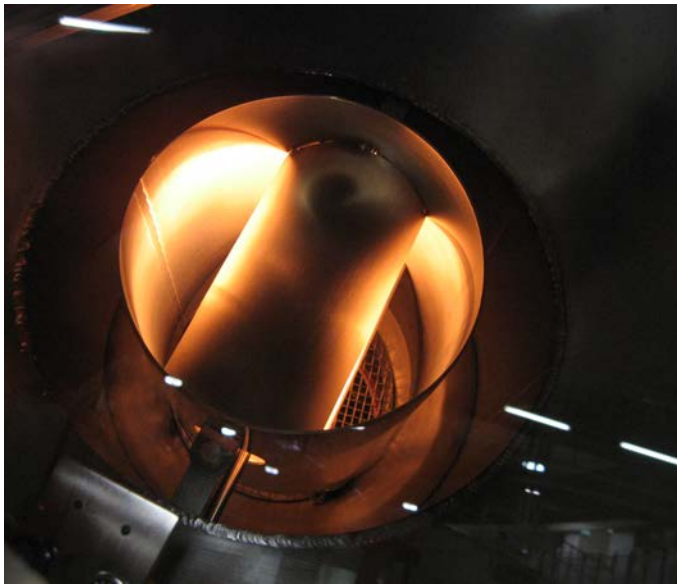
Jonathan is currently devising ways to offer synchrotron-related activities to chemistry students and hopes to eventually be able to provide activities for biology students as well.

Click here to see "A new wave of synchrotron scientists", a feature article published in Chemistry in Australia, November 2011, pages 32-6.

http://www.synchrotron.org.au/index.php/news/publications/a-new-wave-and-other-stories



Top: The winning photo



Lightspeed Photography Competition
December Winner

Thank you to everyone who entered the October-November 2011 photo competition.

With competition entrants submitting well-composed photos of a diverse range of subjects, it was quite a challenge to choose beween them. As well as selecting the winning photo, we have therefore awarded four joint second placings. These photos are all displayed on the website.
http://www.synchrotron.org.au/index.php/news/publications/lightspeed-newsletter/photos-oct-nov-2011

The winner of the October-November 2011 photo competition at the Australian Synchrotron is Chris McNeill from Monash University for a photo (see above) of the soft x-ray beamline analysis chamber.

Joint second placings go to the following, in no particular order:

A photo of the technical floor on Open Day, taken by Evelyne Meier, who holds a postdoctoral position with the synchrotron's accelerator science team.

A photo of Open Day visitors reflected in the plastic curtain shielding the laser light display in the IMBL tunnel, taken by Kia Wallwork, the synchrotron's Principal Beamline Development and Operations Advisor.

A photo of AS staff member Chris Hall lining up with a row of pipe stands in the IMBL tunnel, taken by Robert Grubb (senior mechanical technician at the synchrotron).

A photo of Tubby the Robot at the synchrotron Open Day, taken by Shelly Beveridge, an Open Day visitor.

The next deadline for the photo competition is Friday 16 March 2012. Winners will be announced in the April 2012 edition of Lightspeed.

Events Diary

Events in Australia

Australian Synchrotron User Meeting 2011
8-9 December 2011, Melbourne
The User Meeting is an annual event held to showcase the science being undertaken at the AS, to provide information about our facilities and to help continue to develop our user community.
http://www.synchrotron.org.au/index.php/news/events/australian-events/event/86-User%20meeting

7th International Workshop on Infrared Microscopy and Spectroscopy (WIRMS 2013)
Melbourne, Australia, 2013
More details of the 7th International Workshop on Infrared Microscopy and Spectroscopy with Accelerator-Based Sources will be posted when available.
http://www.elettra.trieste.it/WIRMS/

12th International Conference on X-ray Microscopy (XRM 2014)
Melbourne, Australia, 2014
More details of the 12th International Conference on X-ray Microscopy will be posted when available.
http://xrm2010.aps.anl.gov/

International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS) 2015
Melbourne, Australia, 2015.
Around 400 delegates are expected to attend ICALEPCS 2015. More details will be posted when available.
http://www.icalepcs.org/

Events in Australia

For additional information and listings, see:
http://www.lightsources.org/cms/?pid=1000068

Improving the Data Quality and Quantity for XAFS Experiments
8-9 December 2011

Present and Future Methods for Biomolecular Crystallography
31 May - 10 June 2012
Ettore Majorana Centre, Erice Italy
X-ray crystallography is the pre-eminent technique for obtaining 3D structures of macromolecules at the level of individual atoms. This course will help to equip the next generation of scientists with a deep understanding of the tools they need to solve challenging structural projects and an appreciation for what the future holds. http://www.crystalerice.org/Erice2012/2012.htm

11th International Conference on Synchrotron Radiation Instrumentation (SRI 2012)
9-13 July 2012, Lyon, France
SRI is the largest international forum for exchange and collaboration among scientists involved in development of new concepts, technologies and instruments related to synchrotron radiation research. SRI 2012 will be jointly hosted by the European Synchrotron Radiation Facility (ESRF) and Synchrotron SOLEIL.
http://www.sri2012.org/index.html

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