

# Lightspeed

Australian Synchrotron News

May 2009



**Register Now!**

Early bird registration closes on Friday 26th June

Australian  
Synchrotron



THE AUSTRALIAN SYNCHROTRON IS PROUD TO HOST

## SRI09 | 27 SEPTEMBER TO 2 OCTOBER 2009

THE 10<sup>th</sup> INTERNATIONAL CONFERENCE ON SYNCHROTRON RADIATION INSTRUMENTATION  
AT THE MELBOURNE CONVENTION AND EXHIBITION CENTRE



Australian Government  
Department of Innovation, Industry, Science and Research

This conference is supported by the Commonwealth of Australia under  
the International Science Linkages program.



## FROM THE DIRECTOR: WELCOME TO THE WORLD

*The Shanghai Synchrotron officially opened its doors last week, making it the world's newest synchrotron facility. Although that means the Australian Synchrotron is no longer the new kid on the block, I'm proud to say that we, along with many other facilities, assisted the Shanghai Synchrotron. It was in much the same way that other older synchrotrons helped us get started.*



Prof. Robert Lamb


One of the key reasons why the international synchrotron community is so strong is that we share our knowledge. Come September 2009, we'll be doing it again, only this time the party's in Melbourne for the world's biggest synchrotron science and instrumentation conference: SRI2009.

It's an incredible opportunity for Australians interested in any aspect of the production and application of synchrotron radiation.

Guest speakers include Dr Paul Tafforeau, a paleontologist who is bringing ancient history to

life – not literally, of course – by using the European Synchrotron Radiation Facility to examine insects preserved in amber.

And there's a whole section devoted to the next generation of light sources, led by ex-Melburnian Prof Henry Chapman from DESY (the German electron synchrotron), who is helping to open up a new era in x-ray imaging that will deliver detailed structures of single molecules.

Looks like a good meeting! 

### In this issue:

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### UP TO SPEED

This month our short interview features Elsa van Garderen, instrumentation scientist with the accelerator science group at the Australian Synchrotron.



## GOOD NEWS FOR USERS

*The Federal Budget had good news for the Australian Synchrotron and its users: \$36.78 million for key onsite infrastructure additions and improvements, including onsite accommodation for users.*

Over the next few years we will build a National Centre for Synchrotron Science building to house the synchrotron's user office, a cafeteria, 400-seat auditorium, seminar rooms and office space, as well as catering for educational activities, exhibitions and community engagement.

A separate user accommodation building will contain 50 rooms with communal kitchen and lounge facilities.

Other buildings and extensions to the main synchrotron building will house workstations for staff, 'hot desks' for users, and technical support laboratories.

More: [www.synchrotron.org.au/content.asp?Document\\_ID=5659](http://www.synchrotron.org.au/content.asp?Document_ID=5659)

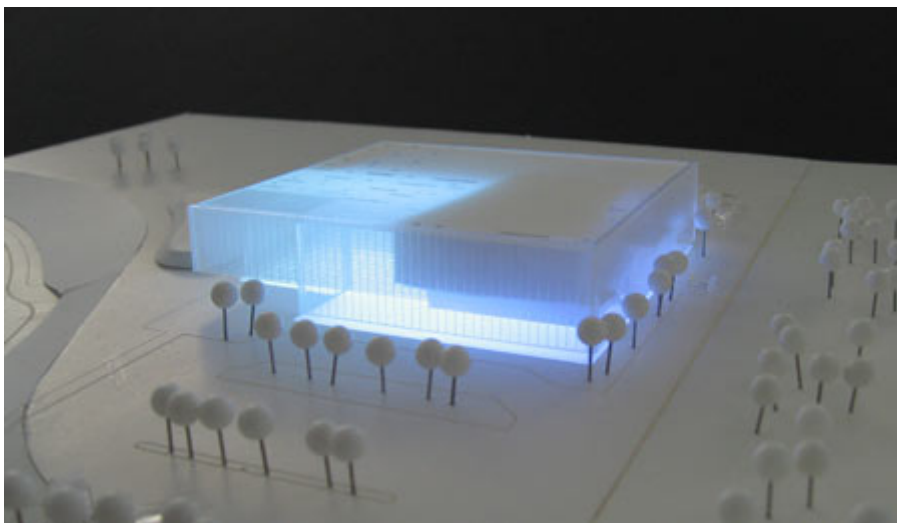


Image courtesy of Bates Smart



## BEAMTIME APPLICATIONS

Beamtime submissions for the 2009/3 round (September – December 2009) will open on 21 May 2009 and close on 17 June 2009.

Key dates for 2009 beamtime submissions are listed here:

[http://www.synchrotron.org.au/content.asp?Document\\_ID=5305](http://www.synchrotron.org.au/content.asp?Document_ID=5305)

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](mailto:user.office@synchrotron.org.au)



### **Describe your job in 25 words or less.**

I am in charge of upgrading the instrumentation of the machine to improve its performance and reliability.

### **Best aspect of your job?**

It's really hands-on. I love pressing buttons, playing with a scope, tweaking and eventually observing what I expected... or not!

### **Worst aspect of your job?**

There isn't a bridge between the control room and the 'bull ring' (the centre of the synchrotron). We always have to walk the long way round.

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

The Swiss Light Source in winter: -20 degrees.

### **Best things about living in Melbourne and why?**

The proximity of nature. Victoria has much to offer outdoors lovers: kangaroos in the fields at dusk, waterfalls in the Otway ranges, the silence at the top of a hidden mountain in the Grampians...

### **Your favourite overseas destination and why?**

I was born in France, did my PhD in the Netherlands and my postdoc in Switzerland. I would like to visit every country if I could. But right now, the country I'm really interested in is Australia. That's why I took this position!

### **What do you think is the most important or interesting aspect of the Australian Synchrotron light source?**

It'll eventually help cure cancer.

### **What do other people think is the most important or interesting aspect of the Australian Synchrotron light source?**

The synchrotron? That place where people want to recreate black-holes, like in Europe?



## BOOST FOR IMAGING AND MEDICAL FACILITY

*The Australian Synchrotron's medical and imaging facility will be upgraded to become the most advanced instrument of its type in the world.*

The facility has been awarded \$13.2 million from the National Health and Medical Research Council (NH&MRC) and \$1.5 million from the Victorian Government for a major expansion that will position Australia at the forefront of this field.

Scheduled for completion in 2012, the upgraded facility will deliver the world's biggest x-ray beam: 60 centimetres wide and five centimetres high. It will support the development of a new generation of techniques for medical imaging and radiotherapy and new approaches to clinical practices, therapies and drug evaluation.

Researchers will use the facility to obtain high-resolution images of cells and tissues, and use specialised markers to follow the movement of cells through tissues and organs in real time. They will also study how radiation interacts with cancer cells and healthy tissues and use their findings to develop better radiotherapy treatments.

Daniel Häusermann, the synchrotron's principal scientist – imaging and medical therapy, said the new funding was due to the efforts of a consortium of research organisations and users supported by the Australian biomedical and medical research communities.

More: [www.synchrotron.org.au/content.asp?Document\\_ID=5658](http://www.synchrotron.org.au/content.asp?Document_ID=5658)

To view an animation of the new facility, go to [www.youtube.com/watch?v=MWkGOJv6t28](http://www.youtube.com/watch?v=MWkGOJv6t28)



L to R: Sean Gallagher (synchrotron board member), Victorian Premier John Brumby and Catherine Walter (synchrotron board chair) with the Australian Synchrotron's Rob Lamb, Ian Gentle and Daniel Häusermann in the tunnel that will house the 136-metre-long medical beamline.

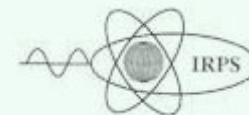
## EVENTS DIARY

### EVENTS IN AUSTRALIA

#### 11th International Symposium on Radiation Physics (ISRP-11)

21-25 September 2009

The University of Melbourne, Australia



ISRP-11 is organised by the International Radiation Physics Society (IRPS) and is supported by DEST, the Australian Synchrotron and the Victorian Government. The meeting is devoted to current trends in radiation physics research.

More: [mcmconferences.com/isrp11](http://mcmconferences.com/isrp11)

#### 10th International Conference on Synchrotron Radiation and Instrumentation 2009 (SRI 2009)

Melbourne Convention & Exhibition Centre

28 September – 2 October 2009



The world's largest and most important forum for synchrotron radiation science and technology communities, SRI is expected to attract 800 international and Australian delegates in 2009. The conference promotes international exchange and collaboration among scientists and engineers involved in developing new concepts, techniques and instruments related to the production and utilisation of synchrotron radiation. More details are available at [www.sri09.org/](http://www.sri09.org/)



## NEW TEST FOR BREAST CANCER

*The SAXS/WAXS beamline at the Australian Synchrotron is at the forefront of a potential new non-invasive test for breast cancer.*

The promising test, which is soon to become commercially available, is being developed by Fermiscan Holdings Ltd, a Sydney-based medical research company. It is based on an Australian discovery that scalp hair from breast cancer patients shows a unique x-ray diffraction pattern – an additional ring in the alpha-keratin diffraction region – which can be detected using an undulator small angle x-ray scattering beamline.

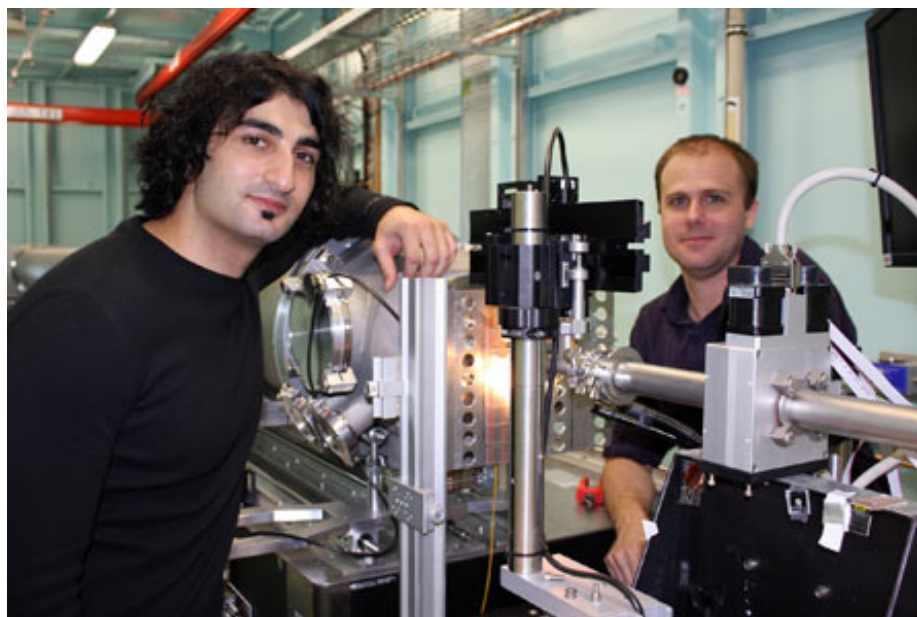
A large-scale Australian clinical trial completed in 2008 found the Fermiscan test had an accuracy of 77 per cent compared to mammography and tissue biopsy. Its accuracy increases when dyed and permed hair samples are eliminated.

Fermiscan researchers are using the SAXS beamline in Melbourne to commercialise the new test. They have also conducted analyses at synchrotrons in the US and Europe, but the Australian Synchrotron offers significant cost and logistical benefits as well as a world-class SAXS beamline.

Breast cancer affects one in eight Australian women and is the most common invasive cancer diagnosed in females worldwide.

The new test could be particularly useful for screening women under 50, whose breast tissue can be too dense for mammography. The technique may also have potential as a diagnostic tool for other diseases.

More: [http://www.synchrotron.org.au/content.asp?Document\\_ID=5652](http://www.synchrotron.org.au/content.asp?Document_ID=5652)



Joseph Haklani (Fermiscan) and Nigel Kirby (Australian Synchrotron) examine hair samples mounted on the SAXS beamline.



### **BSR/MASR 2010 con-joint meetings Biology and Synchrotron Radiation Medical Applications of Synchrotron Radiation**

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](http://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](http://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](http://www.lightsources.org/cms/?pid=1000068)

### **RADSYNCH 2009**

21-23 May 2009  
Trieste, Italy

The 5th International Workshop on RADIATION safety at SYNCHROTRON radiation sources will enable radiation physicists, radiation safety professionals and other interested parties to share experiences and exchange information about radiological issues involved in design, commissioning, operation and decommissioning of synchrotron facilities and free electron lasers around the world.

More:  
[www.elettra.trieste.it/radsynch09/](http://www.elettra.trieste.it/radsynch09/)

### **XAFS 14 Conference**

26-31 July 2009  
University of Camerino, Italy

The 14th International Conference on X-ray Absorption Fine Structure will cover a wide range of topics, including EXAFS, NEXAFS, XANES, DAFS, SEXAFS, EELFS, XMCD and Auger spectroscopies, microspectroscopy and spectro-microscopy, resonant photoemission, resonant and non-

## THE NEXT BIG THING IN MICROWAVE COMMUNICATIONS

*Queensland company Mesaplexx is using the Australian Synchrotron to develop the next generation of microwave filters for improved mobile phone signal quality and data bandwidth.*

The ceramic filters are used in microwave communications systems. Mesaplexx's first microwave filter is currently being trialled by several telecommunications manufacturers

In such a competitive field, quick results are essential. That's why Mesaplexx materials scientist Toru Yamashita and Mesaplexx consultant solid-state scientist John Barry recently visited the Australian Synchrotron to use x-ray absorption fine structure (XAFS) on the x-ray absorption spectroscopy beamline. XAFS will enable them to gain a more detailed understanding of how the localised atomic structure of the ceramics, particularly the titanium-oxygen bonds, responds to changes in manufacturing conditions – and provide valuable clues about how to produce better ceramics.

Mesaplexx had previously used the synchrotron's powder diffraction beamline to determine the 'unit cell' – the primary building block – of the polycrystalline ceramic structure.

The synchrotron findings will be combined with other test results and computer models to provide insights into the relationship between ceramic structure and performance.

Improved microwave filters could boost data transfer speeds and improve reliability in existing telecommunications networks or increase the range of wireless communications networks being established in new markets such as China and India.

"The Australian Synchrotron is very impressive," John said. "It's equal to any overseas user facility, it's much better organised than some, and the equipment is top rate."

More: [www.synchrotron.org.au/content.asp?Document\\_ID=5651](http://www.synchrotron.org.au/content.asp?Document_ID=5651)



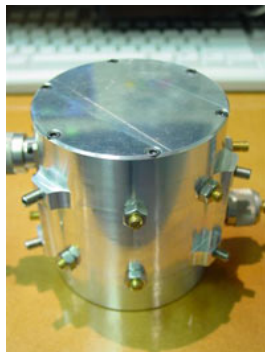
## CREATING A BETTER IMAGE

*Beamline scientist Anton Maksimenko has released the first public version of an open-source software package to enable synchrotron imaging data (from parallel beam geometry) to be turned into three-dimensional computed tomographic (CT) images.*

The CTAS software package can also be used for tomosynthesis reconstruction or diffraction enhanced imaging (DEI) processing of pairs of images.

Originally devised as part of Anton's PhD, the software draws on his experience at synchrotrons in Japan and Australia. It was developed on Linux operating systems and has also been successfully ported to other platforms.

The package is immediately available and contains many ready-to-use features,



Queensland company Mesaplexx is using synchrotron techniques to develop the next generation of microwave filters.

resonant inelastic x-ray scattering, time-resolved XAFS and diffraction.

More: [www.xafs14.it/](http://www.xafs14.it/)

### X-RAY SCIENCE, GORDON RESEARCH CONFERENCE MEETING

2-7 August 2009

Colby College, Waterville, Maine, USA

Conference participants will hear about x-ray-based science at 3rd generation light sources, and scientific plans and early results from 4th generation sources. Sessions include:

- \* x-ray scattering / spectroscopy under extreme conditions
- \* new techniques / optics, detectors and others
- \* x-rays in environment and nano science
- \* x-rays in biology and life science
- \* use of coherent x-rays for imaging and studies of dynamics.

Applications must be submitted by 12 July 2009.

More:

[www.grc.org/programs.aspx?year=2009&program=xray](http://www.grc.org/programs.aspx?year=2009&program=xray)

### WIRMS 2009

Banff, Alberta, Canada

13-17 September 2009

The 5th International Workshop on Infrared Microscopy and Spectroscopy with Accelerator Based Sources will bring scientists and synchrotron users together to discuss the latest developments and trends, future directions and promising applications. Experts will introduce young researchers and graduate students to this rapidly advancing field.

Abstract submission deadline is 12 June 2009.

More: [www.lightsource.ca/wirms2009](http://www.lightsource.ca/wirms2009)

### SAS 2009

13-18 September 2009

Oxford, UK

The XIV International Conference on Small-Angle Scattering will enable scientists using SAS in the study of soft and hard condensed matter (with light, x-rays or neutrons) to discuss the latest scientific results and technological improvements.

More: [www.sas2009.org/](http://www.sas2009.org/)



but Anton warns prospective users that it still contains a few bugs. He is keen to hear from people interested in using the software or testing it and helping to extend the range of applications. In accordance with open software principles, the software is freely available for people to use, modify and redistribute.

Anton is continuing to develop his software for use on the imaging and medical (IM) beamline at the Australian Synchrotron.

More: [ctas.sourceforge.net/](http://ctas.sourceforge.net/)



## NEW WEBSITE

The Australian Synchrotron is developing a new website to meet the evolving needs of its users and other important audiences. We have selected a web designer by competitive tender and we hope to show you a sample of the new website design in the next edition of *Lightspeed*. Our aim is to have the website available to people attending the SRI09 conference in Melbourne in September this year.



## READER FEEDBACK

*Lightspeed* welcomes your comments and suggestions. Please send these to: [info@synchrotron.org.au](mailto:info@synchrotron.org.au) with 'Lightspeed comments' in the subject line.



## 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/content.asp?Document\\_ID=14](http://www.synchrotron.org.au/content.asp?Document_ID=14)



## MORE INFORMATION


A list of Australian Synchrotron personnel can be found here:  
[http://www.synchrotron.org.au/content.asp?Document\\_ID=129](http://www.synchrotron.org.au/content.asp?Document_ID=129).

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