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1. INSTALLATION PROGRESS

On Friday 2 June, the Major Projects Victoria Australian Synchrotron team celebrate the transition from construction and installation to commissioning.

Storage ring installation is complete. This week the final components of the vacuum system were bolted into place and baked—the final installation task before electrons can be injected into the storage ring.

The final components to complete the storage ring— injection kicker magnets—arrived this month from Sweden.

During the past month, the dipole power supply completed all its acceptance tests and staff were trained in the operation and maintenance of the system. Staff training also started on the storage ring RF system.

Multipole and corrector power supplies are being delivered, installed and tested to full power.

LCW (low-conductivity cooling water) and compressed air have been fitted to the vacuum chamber systems.

2. COMMISSIONING PROGRESS

Throughout May, the Australian Synchrotron site team has been readying the storage ring for commissioning with beam in early June.

Installation of the storage ring optical diagnostic beamline is going well. This beamline provides feedback to help optimise the stability and quality of the beam in the storage ring.

Photographs of milestones in commissioning can be found at http://www.synchrotron.vic.gov.au/content.asp?Document_ID=4311

3. BEAMLINE NEWS

BL 1 and 2, Protein Crystallography and Microcrystal

The first robotic sample transfer device for the protein crystallography beamlines has been constructed and is currently undergoing software testing. It has been modelled on the Stanford automated mounting system used at several other light sources, including KEK (Japan) and NRCC (Taiwan). For more details and a video see: <http://smb.slac.stanford.edu/robosync/SAM/> and <http://smb.slac.stanford.edu/facilities/hardware/SAM>.

The beamline components are being manufactured by Oxford Danfysik in UK and are on track for installation in early 2007. For more, contact: Julian Adams

BL 3, Powder Diffraction

The contract for the diffractometer on the powder diffraction beamline has been awarded to Rotary Precision Instruments, Bath, UK. The design review starts shortly. Design specifications for the beamline and diagrams of optics are available at http://www.synchrotron.vic.gov.au/content.asp?Document_ID=470. For more, contact: Kia Wallwork

BL 5, X-ray Absorption Spectroscopy

Final Design Reviews for the XAS beamline and insertion device have been completed. The Insertion Device manufacture is progressing well under contract with Advanced Design Consulting in Ithaca, New York State.

The insertion device is on track for installation by the end of the year prior to beamline installation in 2007. For more, contact: Chris Glover.

BL 6, Soft X-ray

The Final Design Review for the Soft X-ray beamline undulator was completed last month, and the beamline is currently in detailed design review, on track for installation in 2007. The future end station was commissioned at NSRRC (National Synchrotron Radiation Research Centre, Taiwan) in April. Beamline scientist Bruce Cowie attended the commissioning and said it was working well. "It's a very good end chamber", he said, "And it'll be fantastic for what [the scientists] want to do in minerals and surface analysis with rapid sample turnaround." For more, contact Bruce Cowie.

BL 8, Infrared

The contract for construction of the Infrared beamline has been awarded to FMB, Germany, and preliminary design review has commenced. Tenders have closed for the Infrared microscope and are being evaluated. The beamline hutch tender will be released shortly. "We're progressing well and we're on track for installation in early 2007", said Beamline Scientist Mark Tobin. For more, contact: Mark Tobin.

BL 10, Imaging and Therapy

The Imaging and Therapy Beamline will host a seminar on Monday 5 June with Paul Berkvens, visiting from the European Synchrotron Radiation Facility, Grenoble, France, on protection aspects of the operation of the storage ring and beamlines at 3rd generation light sources, with examples from the ESRF. For more, contact: Daniel Hausermann.

For technical information about beamlines or end stations, contact the appropriate beamline scientist at the Australian Synchrotron, Telephone +61(0)3 8540 4100; email

[\[firstname\].\[lastname\]@synchrotron.vic.gov.au](mailto:[firstname].[lastname]@synchrotron.vic.gov.au)

4. USERS NEWS

Australian Synchrotron Operator

The Request for Tender for the Australian Synchrotron Operator was released to two selected tenderers, CSIRO and ANSTO/Worley Parsons, on 5 May.

Scientific Advisory Committees

The International Scientific Advisory Committee (ISAC) visited the Australian Synchrotron to review general progress and beamline development, and to provide input to both the National Collaborative Research Infrastructure Strategy (NCRIS) process and the draft Decadal Plan for Synchrotron Science.

The National Scientific Advisory Committee (NSAC) met to discuss the Decadal Plan for Synchrotron Science, which will be loaded on the synchrotron website for public consultation shortly. Project staff and NSAC members

attended the NCRIS characterisation workshop in Sydney, with ISAC providing advice through a conference call.

Queensland Symposium and Users Network

Approximately 55 people from across the scientific, industry and government sectors attended a Synchrotron Symposium at Custom's House in Brisbane on 25 May, entitled *A New Light for Science & Industry — Opportunities for Queensland Researchers at the Australian Synchrotron*. The event was underwritten by the University of Queensland with support from Future Materials, the Queensland Government and the Victorian Government. Mr Neil Roberts, Parliamentary Secretary, Queensland Department of State Development, Trade and Innovation provided a closing address and reiterated the Queensland Government's strong commitment to the research community.

One participant commented: *The synchrotron symposium was very well organised and the speakers did an excellent job at presenting to a diverse audience that included scientists and non-scientists. The symposium was informative regarding the current stage of the Australian synchrotron and the importance and range of applications of synchrotron science conveyed in an interesting and educational manner, that I know was inspiring for many—including two of my students who also attended.* (Dr Helen Blanchard, Research Leader, Institute for Glycomics, Griffith University—Gold Coast Campus, Queensland)

A local synchrotron network, Q-SUN, was also launched. For further information, contact: Sophie Betts <Sophie.Betts@premiers.qld.gov.au>

Synchrotron Scientists Win Federation Fellowships

Three Victorian synchrotron scientists were awarded Federation Fellowships on 11 May. Professor Keith Nugent from Melbourne University won his second Fellowship, and was joined by Dr Jamie Rossjohn from Monash University and Professor Michael Parker from St Vincent's Institute for Medical Research.

[The Editor would be pleased to hear of any other awards or honours within the Australian and New Zealand synchrotron community.]

Decadal Planning for Synchrotron Capabilities

The consultation paper on the 10-year plan for synchrotron science in Australia and New Zealand is now online at:

http://www.synchrotron.vic.gov.au/content.asp?document_id=4293.

Responses are requested by 23 June to contact.us@synchrotron.vic.gov.au.

The consultation plan has been developed from submissions about trends and beamlines, prioritisation of options and applications. The Decadal Plan committee is

chaired by Prof. Keith Nugent of Melbourne University, with coordination by Miriam Goodwin.

Collaboration with International Light Sources

A Memorandum of Understanding was signed between the Australian Synchrotron and Diamond Light Source, the new British synchrotron under construction. Diamond Chief Executive Prof Gerhard Materlik said he was looking forward to a scientific exchange with Australia.

“Synchrotron science has developed rapidly in the last 20 years thanks to a very open, collaborative spirit among the community,” Prof. Materlik said.

The Australian Synchrotron also signed a Memorandum of Understanding to promote scientific collaboration with the Swiss Light Source, which opened in 2001. Director of Large Research Facilities at Switzerland’s Paul Scherrer Institute (which includes the SLS) Prof Albin Wruhlich, said he was impressed with progress on the Australian Synchrotron. “This light source will open up new vistas for Australian scientists. I look forward to a productive relationship between SLS and the Australian Synchrotron”, he said.

Australia has also signed a Memorandum of Understanding with the Photon Factory in Japan. Victorian Minister for Innovation, John Brumby, said “As science becomes more complex and more costly, working with international partners makes sense.” The Director of the Institute of Material Structure Science which hosts the Photon Factory, Prof Osamu Shimomura, said he was keen to further strengthen Japanese–Australian science ties. “We are delighted that Australia’s own light source will come on stream next year”, Prof Shimomura said. “Australians have been doing high quality science at the Photon Factory, and building strong relationships with our people. The bond between our facilities will benefit both Australia and Japan”, he said.

5. VISITORS

Both international advisory committees visited the Australian Synchrotron facility during the past month.

The International Machine Advisory Committee visited 26–28 April, once again commenting that they were very impressed with the rapid progress being made and the quality of the work being done at site, and providing valuable advice to the AS team. They will be back in August to assist with storage ring commissioning.

The International Scientific Advisory Committee also visited the facility, as reported above.

Dr Rob Adam and Dr Wessel van Zyl de Villiers from the Nuclear Energy Corporation of South Africa (NECSA) visited the facility as part of science relationship building between Australia and South Africa.

National Collaborative Research Infrastructure Strategy facilitators Simon Ringer and Ian Pitman visited the Australian Synchrotron.

Colleen Christensen, Canadian Light Source, visited the Australian Synchrotron and met with scientists in the Victorian Department of Primary Industries to develop collaboration on agbiotech research.

6. FORTHCOMING EVENTS

AUSTRALIAN EVENTS

Physics Teachers Professional Development Afternoon

Wednesday 7 June 2006, 1pm – 4.30pm,
Monash Science Centre, Normanby Road, Clayton

VCE Physics teachers are invited to attend a half-day seminar on teaching the Detailed Study 'Synchrotron Science and its Applications'. A recent poll of Victorian physics teachers indicated that around 20% intend to teach the Synchrotron Detailed Study in 2006 (up from 13% in 2005), representing the biggest increase of any of the three DS options. Contact STAV (Science Teachers Association of Victoria) or the Australian Institute of Physics (VIC) Education Committee for more information. No charge. Download a Registration Form from

<http://www.stav.vic.edu.au/home/conferencesandevents/synchphysicspd>

Launch of the Australian Synchrotron Exhibition at Monash Science Centre

Wednesday 7 June 2006, 4.30pm – 6.30 pm,
Monash Science Centre, Building 74, Normanby Road,
Monash University.

RSVP online to attend:

http://www.synchrotron.vic.gov.au/content.asp?Document_ID=4503

The Australian Synchrotron project has set up an exhibition at the Monash Science Centre in the lead up to the facility opening next year.

To celebrate, we're holding a launch and official opening next Wednesday, 7 June 2006 from 4.30pm.

Our special guest for the evening will be Bernie Hobbs, ABC science journalist and panellist on the *New Inventors* program.

To view the invitation (including venue details), go to:

http://www.synchrotron.vic.gov.au/retrievemedias.asp?Media_ID=4178

Features of the exhibition include:

- interactive displays on what a synchrotron does (everything from better chocolate, to faster jet engines, to the cause of Beethoven's death)
- video interviews with working scientists and scientific leaders about what the Australian Synchrotron will be used for

- a life-size model of a synchrotron beamline (the equipment that captures synchrotron light and delivers it to the researcher's laboratory)

The exhibition is most suitable for visitors aged 12+. Synchrotron talks and demonstrations for school groups, including hands-on experiments, can be arranged. VCE Physics students will be particularly catered for with curriculum-specific material on the synchrotron optional unit. There is no cost to attend the exhibition and free parking is available.

AIP 17th National Congress 2006

3–8 December 2006, Brisbane Convention and Exhibition Centre, Queensland

Australian Institute of Physics National Congress. Excellent plenary speakers already confirmed.

www.aipc2006.com. Email: aipc2006@icms.com.au

ABIC 2006: Unlocking the potential of agricultural biotechnology

6 – 9 August 2006, Melbourne Exhibition and Convention Centre, Melbourne, Australia

The Agricultural Biotechnology International Conference (ABIC) is the major global conference for agricultural biotechnology. It is expected to attract more than 1,000 national and international delegates.

A comprehensive program featuring leading global scientific and industry speakers will focus on the innovation and commercialisation of agricultural biotechnology to achieve maximum benefit for the global community.

The Australian Synchrotron will have a display stand at the event. www.abic2006.org

INTERNATIONAL USERS CONFERENCES

9th Annual Users' Meeting of the Canadian Light Source

16–18 June 2006, University of Saskatchewan, Canada
In conjunction with the 3rd Northern Lights Summer Conference of the Canadian Federation of Biological Societies (14-16 June) on 'Shining Light on Biological Processes'. The Users' meeting is organised by the CLS Users' Advisory Committee and will be a great opportunity to learn about the progress of the CLS, present your recent synchrotron work, and meet fellow users.

<http://www.lightsource.ca/uac/meeting2006/>

13th International Conference on X-ray Absorption Fine Structure, XAFS-13

9–14 July 2006, Stanford University, California

<http://www-ssrl.slac.stanford.edu/xafs13>

SRMS-5, 5th International Conference on Synchrotron Radiation in Materials Science

30 July – 2 August 2006, Chicago

Biennial conference bringing together leading-edge synchrotron x-ray researchers in the materials sciences.

http://www.aps.anl.gov/News/Conferences/2006/SRMS/conf_regr_online.htm

More at: <http://www.aps.anl.gov/News/Conferences/2006/SRMS/index.html>

9th International Conference on Biology and Synchrotron Radiation

13–17 August 2007, Manchester, England.

<http://www.bsr2007.com> .

ICIEAA-10: International Conference on Electronic Spectroscopy and Structure

28 August – 1 September 2006, Foz do Iguacu, Parana,

Brazil <http://www.lnls.br/ices10>

7. SCIENCE HIGHLIGHTS FROM AROUND THE WORLD

News and recently published research assisted by synchrotron science

Structure of key TB protein revealed

Tuberculosis remains one of the deadliest threats to public health. Every year two million people die of the disease, which is caused by the microorganism *Mycobacterium tuberculosis*. Roughly one third of the world's population is infected and more and more bacterial strains have developed resistance to drugs.

Researchers from the Hamburg Outstation of the European Molecular Biology Laboratory (EMBL) and the Max Planck Institute for Infection Biology (MPIIB) in Berlin have now obtained a structural image of a protein that the bacterium needs for survival in human cells. This image reveals features of the molecule that could be targeted by new antibiotic drugs. The results appear in this week's online issue of the Proceedings of the National Academy of Sciences (PNAS). More at:

<http://www.medicalnewstoday.com/medicalnews.php?newsid=442261>

Timing atoms in the nanoworld

As scientists and engineers build devices at smaller and smaller scales, grasping the dynamics of how materials behave when they are subjected to electrical signals, sound and other manipulations has proven to be beyond the reach of standard scientific techniques, given the ultrafast reaction time of the tiny materials. But now a team of University of Wisconsin-Madison researchers has found a way to time such effects at the nanometer scale, in essence clocking the movements of atoms as they are manipulated using electric fields.

The accomplishment is important because it gives scientists a way to probe another dimension of a material's structure at the nanometer scale. Adding the dimension of time to their view of the nanoworld may enhance the ability to develop materials for improved memory applications in microelectronics of all kinds, among other things. Using x-rays from the Advanced Photon Source synchrotron and measuring how the x-rays were reflected as the atoms in the material switched positions, "you can see in time how the crystal structure

(of the material) changes as the switching polarization propagates through the lattice," lead researcher Alexei Grigoriev said. Published May 12 edition of the journal *Physical Review Letters*, For more see:

<http://www.photonics.com/printerFriendly.aspx?contentID=82796>

Bacterial environmental sensors

When humans taste or smell, receptors unique to each nerve cell detect the chemical and send signals to the brain, where many cells process the message to understand what we are smelling or tasting. But a bacterium is just a single cell, and it must use many different receptors to sense and interpret everything around it. Bacteria can sense in their environments changes in molecular concentrations as small as 0.1 percent, the equivalent of one drop diluted in a pool of a 1,000 drops. How do they do it?

New Cornell research, highlighted on the cover of the May issue of *Nature Structural and Molecular Biology*, reveals that receptors assemble into a kind of cooperative lattice on a bacterium's surface to amplify infinitesimal changes in the environment and kick off processes that lead to specific responses within the cell. More at:

http://www.news.cornell.edu/stories/May06/Crane_bacteria.ksr.html

Developing plastic electronics

For close to a decade, researchers have been trying to improve the performance of plastic semiconductors to the level of amorphous silicon—the semiconductor used in low-cost electronics such as photovoltaic cells for solar power and thin-film transistors used in flat screen laptops and TVs. Researchers at Stanford Linear Accelerator Center have now shown that the electrical performance of plastic semiconductors can be controlled and improved with surface treatments. More at:

<http://www.physorg.com/news65974656.html>

8. MORE INFORMATION

A list of Australian Synchrotron Project personnel can be found at http://www.synchrotron.vic.gov.au/content.asp?Document_ID=129.

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9. HOW TO SUBSCRIBE OR UN-SUBSCRIBE

TO SUBSCRIBE

http://www.synchrotron.vic.gov.au/content.asp?Document_ID=196&FirstName=&Email=&x=16&y=9

TO UNSUBSCRIBE

Send an email with UNSUBSCRIBE Synchrotron in the Subject line to contact.us@synchrotron.vic.gov.au