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The ARC Centre of Excellence for Coherent X-ray Science (CXS) is an Australian Government Initiative which began in July 2005 to explore what can be achieved with coherent X-ray optics; including an understanding of exotic phenomena such as X-ray phase discontinuities.

CXS headquarters is located at the University of Melbourne in Victoria, Australia, with participating nodes at La Trobe University, Monash University, Swinburne University of Technology, Griffith University and the CSIRO. Its mission is to be the world leader in the development of non-crystallographic techniques for the determination of protein structures.

"In Coherence" is produced quarterly (or thereabouts) by CXS. Contributions are welcome and should be forwarded to Ms. Tania Smith, CXS Chief Operating Officer, University of Melbourne, Parkville, Vic, 3010, fax to +61 3 9347 8912, email: [cxsenquiries@ph.unimelb.edu.au](mailto:cxsenquiries@ph.unimelb.edu.au) or Ms. Rosslyn Ball, Administration, email: [r.ball@ph.unimelb.edu.au](mailto:r.ball@ph.unimelb.edu.au)

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## Japanese Connections

CXS is pleased to announce the signing of a Memorandum of Understanding (MOU) and ongoing collaboration with the RIKEN SPring-8 Center in Hyogo, Japan.

The MOU was the result of many years of discussion and networking with RIKEN SPring-8 Centre Director and CXS Partner Investigator, Dr Tetsuya Ishikawa, and promises to strengthen our collaborative scientific research and enhance the exchange of academic research information between the two centres.

The first major event between the centres will be the CXS, Japanese XFEL Project and Song Initiative Research Unit of RIKEN 4th International XFEL Workshop to be held in Queensland, Australia in August 2011.

This five day workshop will host over 40 speakers presenting the latest developments in the areas of accelerators, imaging, data analysis/theory, and instrumentation. Poster presentations and formal collaborative discussions will also be conducted.

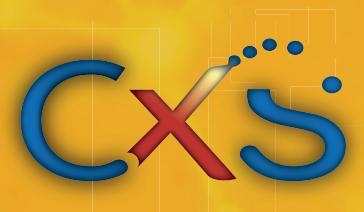
Facility overviews will be presented by:

- Dr Tetsuya Ishikawa, RIKEN SPring-8
- Professor Keith Nugent, CXS
- Dr Adi Paterson, ANSTO
- Dr Do Yong Noh, National Tsing Hua University, Taiwan
- Dr Wai-Keung Lau, National Synchrotron Radiation Research Center, Taiwan
- Dr Rozhong Tai, Shanghai Synchrotron Radiation Facility, China.

This workshop promises to be an informative and memorable experience and will help pave the way into the future of imaging technology.



**SPring8 - the world's largest third-generation synchrotron radiation facility located in Hyogo, Japan**



Autumn 2011

Newsletter for ARC Centre of Excellence for Coherent X-Ray Science

# In Coherence

## Challenging Changes

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### Coming Events

#### CXS International Workshop 2011

October 10 - 12, 2011

Bio21

University of Melbourne

This workshop will focus on high resolution imaging of biological samples using synchrotron and laser X-ray sources as well as pioneering electron and light microscopy techniques and protein structure determination techniques.

#### 4th Annual International XFEL

Workshop

August 29 - September 2, 2011

Palm Cove, Cairns, QLD

This workshop will focus on imaging and imaging facilities, accelerators, instrumentation and data analysis and theory.

CXS is proud of its staff and their expertise and so it came as no surprise when its Director, Deputy Director and Experimental Methods Program Manager were all snapped up by other ventures.

CXS Director, Professor Keith Nugent, was appointed recently as the Assistant Vice-Chancellor (Special Projects), the University of Melbourne, and is heading up some new initiatives for the University.

Keith has been busy setting up committees and attending meetings as part of his new work. A major goal is to manage the academic relationship between the University of Melbourne and the new IBM Global Research and Development Laboratory exploring the world's most challenging sustainability problems.



**Professor Keith Nugent**



**Professor Andrew Peele**

If that is not enough to keep Keith busy, he has also been appointed as part-time Director of the Australian Synchrotron located in Blackburn Road, Clayton, where he spends some of his time leading the team into the future.

Keith says his secret to handling all of his jobs is simply 'applying effective time management and having an excellent team to work with.'

To prove Keith's point, Professor Andrew Peele, CXS Experimental Methods Program Leader, has been seconded to the Australian Synchrotron for 12 months as its Head of Science.

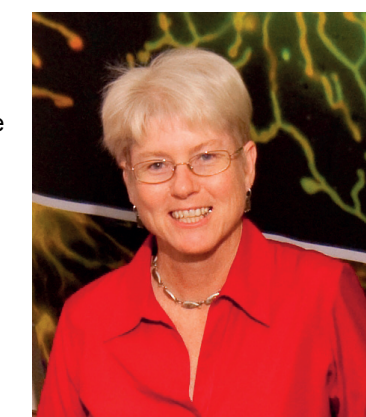
Andrew's new role as Head of Science is to provide leadership to the science program at the Australian Synchrotron and to help develop its vision for the future. Andrew has been subject to a great deal of media attention. We were also delighted to see his leadership recognised by his promotion to Professor at La Trobe University.

In another CXS staff change, Professor Leann Tilley has taken up a position as a Professor of Biochemistry and Molecular Biology, in the Bio21 Molecular Science and Biotechnology Institute at the University of Melbourne.

This move offers excellent opportunities to expand the scope and activities of the Biology Program of CXS by embedding the work of Professor Tilley's team within the excellent research environment of the Bio21 Institute.

The Institute operates a large array of platform technologies including an outstanding electron microscopy capability, as well as light microscopy, metabolomics, mass spectrometry and NMR.

CXS wishes Keith, Leann and Andrew well in each of their new positions and knows that they will all maintain their current work with the Centre.



**Professor Leann Tilley**

## In Brief

## Publications:

Publications for the first half of 2011 include:

Quiney, HM., Nugent, KA., "Biomolecular imaging and electronic damage using X-ray free-electron lasers." *Nature Physics*, 7, 142-146 (2011)

Hanssen, E., Knoechel, C., Abu-Bakar, N., Deed, S., LeGros, M., Tilley, L. "Cryo transmission X-ray imaging of the malaria parasite, *P. Falciparum*." *Journal of Structural Biology*, <http://dx.doi.org/10.1016/j.jsb.2010.08.013> (2010)

Luu, MB., Arhatari, BD., Tran, CQ., Balaur, E., Pham, BT., Vo, NT., Chen, T., Putkunz, CT., Kirby, N., Mudie, S., Peele, AG. "Quantitative phase imaging with polychromatic X-ray sources." *Optics Express*, 19, 8127-8134 (2011)

Clark, AC., Dias, DA., Smith, TA., Ghiggino, KP., Scollary, GR. "Iron(III) tartrate as a potential precursor of light induced oxidative degradation of white wine: studies in a model wine system." *Journal of Agricultural Food Chemistry*, 59, 3575-3581 (2011)

Scholten, RE., "From Lab to MOGLabs: commercialising laboratory lasers." *Australian Physics*, (ISSN 1837-5375) 47(5) 106 - 110 (Spt/Oct 2011)

## CXS Visitors:

Ms Nora Vogtele from the University of Freiburg Germany visited the Biological Sciences Program at La Trobe University.

Professor Gerald Smith, Victoria University Wellington, New Zealand visited the Short Wavelength Laser Source Program at Swinburne University of Technology.

Habus Yusiffm Tohoku University, Japan visited the Short Wavelength Laser Source Program at Swinburne University of Technology.

Dr Tetsuya Ishikawa, Yasuko Matsumoto, Masataka Nakamachi and Katsuaki Miyajima visited the CXS University of Melbourne office.

## Conferences &amp; Workshops:

Associate Professor Harry Quiney delivered a colloquium "Biomolecular imaging using XFEL sources: towards the molecular microscope" to the school of Physics at the University of Melbourne, February 2011.

Nadia Davidson attended a workshop on High Performance Computation at the University of Melbourne, February 2011.

Professor Mike Ryan gave a seminar talk at the Menzies Research Institute Tasmania, University of Tasmania, May 2011.

Professor Keith Nugent was a keynote speaker at the Crystal 27 Conference in Rotorua, New Zealand, April 2011.

Dr Victor Streltsov gave a poster presentation at the 36th Lorne Protein Conference, in Victoria, February 2011.

David Thompson attended the Victoria Summer School in Ultracold Atomic Physics, January/February 2011.

The Experimental Methods Program held a workshop titled Scanning Transmission and Diffraction Microscopy at the Australian Synchrotron in June 2011.

## Media:

Professor Leann Tilley and Robin Anders were interviewed for the Millions Against Malaria Foundation Documentary about Ken Evers and Tim Pryse's journey around the world in a GA8-TC Airvan to raise money for the fight against malaria.

Professor Keith Nugent appeared on 774 ABC afternoon radio program on the 28th June to discuss mirages.

## Farewell to Members:

Dr Dansha Jiang and Bohumil Maco have resigned to return to their homeland.

Jeff Yeoman has completed his PhD and taken up an Associate Lecturer position at La Trobe University.

Dr David Vine has accepted a position at APS, USA.

## Welcoming New Members:

CXS would like to welcome the following new members:

## Biological Science Program:

- Sarah Frankland, Post Doc
- Heather Lewis, Research Assistant
- Jesse Rudd-Schmitt, Honours student
- Silvia Teguh, PhD student
- Kirstin Elgass, Post Doc
- Alex Lowdin, Technical Assistant

## Experimental Methods Program:

- Aidan Carroll, PhD
- Mark Junker, Post Doc

## Ultra Cold Plasma Source Program:

- Dave Sheludko, Research Associate
- Dene Murphy, MSc
- Joshua Torrance, MSc

## Outreach:

The Short Wavelength Laser Source Program will be organising the Super-Resolution Microscopy Symposium as part of IQEC/CLEO Pacific Rim in 2011.

Professor David Kielinski attended the AIP Physics Lecture at the Anglican Church Grammar School and met with high school students in May 2011.

## Awards:

Congratulations to the following members:

Alex Maier received the La Trobe University DVC(R)/Vice Chancellor Excellence in Research Award for Mid Career Researchers. He was also one of three international scientists to receive the Khwarizmi Award at a ceremony in Tehran 2011.

Diana Stojanovski received the La Trobe University Deans Award 2011.

Professor Leann Tilley received the 2011 Beckman Coulter Discovery Science Award from the Australian Society for Biochemistry and Molecular Biology.

## Talking Backwards 2011

This innovative workshop was created in 2009 to help CXS students from each of the participating disciplines to work together to better understand the research being undertaken by the different programs. La Trobe University once again hosted this workshop which saw over 20 students attend.

The idea driving this workshop is that in order for physicists to understand what biologists do and for biologists to understand what physicists do, they both need to embrace a seachange of sorts.

The physicists work with the biologist to illuminate some important biological concepts while the biologists work with the physicists to identify some important physics concepts. A student from each of the groups must then explain their findings from their own perspective.

Presenters included Megan Dearnley, Biological Sciences Program, Marc Kvensakul, Biological Sciences Program, Michael Jones, Experimental Methods Program and Guido Cadenazzi, Experimental Methods Program.

Students thought the workshop was a great opportunity to learn some of the more challenging aspects about programs other than their own and were quick to point out the difficulty often encountered when trying to understand the terminology used by researchers from another disciplines.

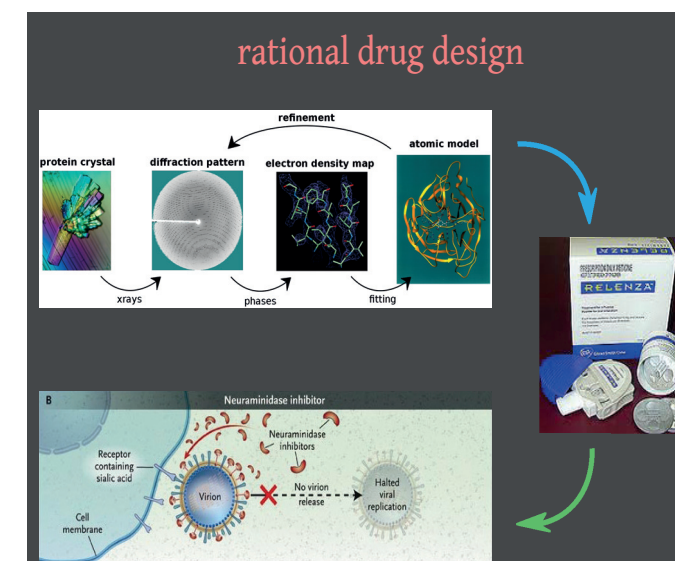
The workshop also facilitated networking and the opportunity for students to broaden their knowledge of the diversity of CXS related research.

Everyone found the talks interesting and informative and left the workshop knowing that they better understood the basics of each other's program and welcomed the challenge to gain a greater understanding of the different thought processes between physics and biology.

A number of students were so enthusiastic about the Talking Backwards Workshop they thought that it would be beneficial to introduce a "Talking Forwards" Workshop where biologists and physicists can present an elementary tutorial about their own field of work. That way CXS can demonstrate another aspect of the way in which it fosters and promotes interdisciplinary research to its students.

The "Talking Forwards" concept will be taken to the next CXS Executive Committee Meeting, to be held in Brisbane's Griffith University, for discussion and potential implementation in 2012.

Attendees were also quick to agree that the workshop should be held as an annual event, particularly for the benefit of new CXS members, and hopefully with such a nice lunch.



A slide from Guido Cadenazzi's presentation explaining rational drug design

## What are phospholipids and what do they do?



Phospholipids come in jars, with prices from \$40 to \$60, apparently they make you feel better ... and they are complex?

A slide from Michael Jones' presentation answers the question - What are phospholipids and what do they do?