In Coherence

Autumn 2010

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

# Attosecond Program plays host to Executive Committee

Inside This Issue




William Wallace demonstrates the Attosecond lab at Griffith University

Members of the CXS Executive Committee travelled to sunny Brisbane recently to attend the April 2010 Committee Meeting and Workshop. The delightful bushland setting and musical warbling of the birdlife at the Griffith University Nathan Campus provided a perfect backdrop for the mini workshop which attracted 25 delegates and was hosted by Associate Professor Dave Kielpinski.

Attendees were treated to a number of interesting and informative talks given by a variety of speakers. The program included the following topics:

- X-ray lasers review - Professor Keith Nugent
- High-harmonic generation for imaging - Professor Lap Van Dao
- Attosecond Science at the AASF - Associate Professor Robert Sang
- Modeling of intense laser-molecule interactions - Dr Harry Quiney

In the evening the CXS Executive Committee were joined by members of Griffith University academia for an enjoyable dinner in the friendly ambience of a local Chinese restaurant. The night's activities were capped off with a late night stroll along the streets of balmy Brisbane.

The next morning Committee members were taken on a tour of Griffith University's state-of-the-art laboratories by the Attosecond Program students and staff who proudly demonstrated an expertise and passion for their research. In particular, Robert Sang presented several tours of the Ultra Fast Laboratories apparatus' and whose presentation was the subject of envious commentary by many of the experimental visitors.

David Kielpinski gave a guided tour of the flagship project Atomic Hydrogen Source Labratory which will form the focus of collaborations between the Attosecond and Theory and Modelling programs. The Committee was also treated to a glimpse of the facilities which David and Robert have developed over many years. As tradition dictates a business card was burnt by the intense laser light to impress upon the observers the lasers formidable power.

CXS Executive Committee members would like to thank Dave Kielpinski, Robert Sang, Naylyn Gaffney, Dane Laban, Adam Palmer, Michael Pullen and William Wallace for their friendly hospitality during the visit to Brisbane and look forward to incorporating it as an event in the CXS calendar.

**CNIC Super Resolution Microscopy Workshop**

**1 October 2010**

**Melbourne Convention Centre**

## Invited Speakers

- **Professor Sam Hess**, University of Maine, USA
- **A/Professor Cynthia Whitchurch,** University of Technology, Sydney
- **A/Professor Trevor Smith**, University of Melbourne
- **Professor Leann Tilley,** La Trobe University
- **Professor Guy Cox**, Sydney University

For more information visit

**www.cxs.org/cnic**

# In Brief

## Publications:

Publications for the previous quarter include:

Laban, D.E., Wallace, R., Glover, D., Sang, R.T., Kielpinski, D. *"Self-focusing in air with phase-stabilized few-cycle light pulses"* Opt Lett 35, 1563 (2010)

Schempp, H., Gunter, G., Hofmann, C.S., Giese, C., Saliba, S.D., DePaola, B.D., Amthor, T., Weidemuller, M., Sevincli, S. Pohl, T. *"Coherent Population Trapping with Controlled Interparticle Interactions."* Phys. Rev. Lett. 104, 173602 (2010)

Dubey, A.K., Bharadwaj, P., Varghese, J.N., Macreadie, I.G. *"Alzheimer's amyloid beta rescues yeast from hydrozide toxicity."* Alzheimer's Dis. 18, 1: 31-33 (2009)

Hall, C.R., Dao. L. V., Koike, K., Sasa, S., Tan, H. H., Inoue, M., Yano, M., Jagadish, C., Davis, J. A. *"Using graded barriers to control the optical properties of ZnO/$Zn_{0.7}Mg_{0.3}O$ quantum wells with an intrinsic internal electric field."* Applied Physics Letters 96, 193117 (2010)

Putkunz, C.T., Pfeifer, M. A., Peele, A. G., Williams, G. J., Quiney, H. M., Abbey, B, Nugent K. A.*"Fresnel coherent diffraction tomography."* Optics Express, 18, 11746 - 11753 (2010)

Balaur, E., Peele, A. G., "*Electron-beam-induced alteration of the dielectric properties of sandwiched self assembled organic monolayers."* Journal of Applied Physics, 107, 074103 (2010)

Hanssen, E., Carlton, P., Deed, S., Klonis, N., Sedat, J., DeRisi, J., Tilley, L. "*Whole cell imaging reveals novel modular features of the exomembrane system of the malaria parasite, Plasmodium falciparum.*" Int J Parasitol, 40 (1): 123-34, Jan (2010)

Williams, G. J., Quiney, H. M., Peele, A. G. "*Fresnel Coherent Diffractive Imaging: treatment and analysis of data.*" New Journal of Physics, 12 035020 March (2010)

## CXS Visitors:

Dr Bohumil Mac, School of Chemistry and Molecular Biosciences, University of Queensland visited the Biological Sciences Program at La Trobe University.

## Conferences & Workshops:

Associate Professor Dave Kielpinski gave a talk at the Annual Meeting of the Division of Atomic , Optical and Molecular Physics of the American Physical Society, Houston, Texas, USA, May 2010.

Assocate Professor Robert Scholten presented "Ultrafast Dynamics with X-rays and Electrons" at the Banff meeting on Structural Dynamics, Canada, February 2010.

Professor Lap Van Dao was an invited speaker at the 12th International Conference on X-ray Lasers, Gwangji, Korea, June 2010.

Professor Keith Nugent gave a seminar presentation at the Illinois Institute of Technology, USA, March 2010.

Professor Mike Ryan was an invited speaker at the Peter MacCullum Cancer Institute Seminar, March 2010.

Dr Harry Quiney gave a contributed talk at the Coherence 2010 Conference, March 2010.

## Education:

Associate Professor Rober Sang took part in a Griffith University promotional video providing an overview of the Attosecond Science facility.

Professor Leann Tilley was interviewed by Jill Rowbotham for the article, "*Researchers probe the depths of deadly parasite*" for The Age Higher Education Supplement, April 2010.

Dr Eugeniu Balaur delivered the practical component of the La Trobe University Masters subject - Advanced Nanmaterials and Fabrication - which consisted of four two week laboratory projects.

Samantha Deed gave a talk to the La Trobe University Outreach program on how malaria parasites are grown in the lab for research studies.

## Awards and Recognitions:

Congratulations to Dr Connie Darmanin who recieved the CSIRO Payne Scott Award 2010.

Jesse Clark and Corey Putkunz were awarded student bursaries to attend Coherence 2010.

Professor Keith Nugent was appointed to the Board of the Australian Synchrotron.

## Welcoming New Members:

Grant Van Riessen, lecturer with the Experimental Methods Program at La Trobe University.

Mauro Maiorca, PhD student in the Biological Science Program, La Trobe University.

Viviane Richter, Research Assistant, Biological Science Program, La Trobe University.

Welcome back to Dr Brian Abbey, Research Fellow, Experiemental Methods Program, University of Melbourne.

## Member Departures:

Jesse Clark submitted his PhD and has taken a position with University College London.

## Postdoc/Student Workshop

Delegates at the CXS Beechworth Retreat identified that students and post docs needed to gain a better understanding of how CXS performed as a Centre of Excellence, how groups fitted together under the auspices of the Centre, and where and why the ideas for interdisciplinary collaborations took place.

A decision was made to hold a two day workshop to address these issues. The workshop was held on the 24 and 25 June 2010 with a day at the University of Melbourne and at La Trobe University respectively. The workshop was organised by Liisa Hirvonen, Mark Junker, Lachlan Whitehead and Jeff Yeoman.

During the course of the two-day workshop one member from each group presented a talk on the type of activities their group was undertaking and how those activities fitted in with the overall CXS plan. A question and answer session followed each of the talks.

In the afternoon a guided tour of the laboratories was provided by the host University.

Workshop debriefing session

For many, the highlight of the workshop was the inclusion of the Griffith University group, as most of those present knew little about the work being done by the Attosecond Program group in Brisbane. In the de-briefing session (over beers), it was agreed that the workshop had been worthwhile and there was unanimous concensus that another workshop should be held in Brisbane.

## The CNIC Route

The Cellular Nano-Imaging Consortium (CNIC) is an affiliation of scientists with interests in Super-Resolution Optical Microscopy managed under the auspice of the Australian Research Council (ARC) Centre of Excellence for Coherent X-ray Science.

Its inception is the direct result of a joint initiative undertaken by Professor Keith Nugent (CXS Director, The University of Melbourne), Professor Leann Tilley (CXS Deputy Director, La Trobe University) and Dr Trevor Smith (School of Chemistry, The University of Melbourne) to bring together institutions and research leaders with cross-disciplinary expertise and an interest in using and/or developing nano-imaging optical methods.

CNIC provides online access to information about conventional and super-resolution optical imaging techniques and what resources are currently (and potentially) available to interested parties. Through CNIC, workshops and conference sessions will be organised to inform Australian scientists about new high-resolution imaging modalities. CNIC aims to co-ordinate efforts to generate a super-resolution imaging capability in Victoria, providing information and access to the new techniques.

CNIC is working to ensure that all Victorian scientists have access to the Super-Resolution Microscopy format they need to be competitive as international research leaders.

The first CNIC Super Resolution Microscopy Workshop will be help at the Melbourne Convention Centre on Friday 1st October 2010. This workshop is jointly supported by CXS and OzBio2010 and will highlight recent developments and applications of high resolution imaging methods.

To register and to find out more information on the workshop or CNIC visit the website at www.cxs.org/cnic

CNIC
CELLULAR NANO-IMAGING CONSORTIUM

The University of Melbourne
Melbourne Vic 3010
Australia
Phone: 03 8344 5444
Fax: 03 9347 8912
E-mail: cxsenquiries@ph.unimelb.edu.au

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 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 by CXS. Contributions are welcome and should be forwarded to Ms. Tania Smith, CXS Chief Operating Officer, University of Melbourne Vic 3010, fax to +61 3 9347 8912, email: cxsenquiries@ph.unimelb.edu.au or Ms. Rosslyn Ball, Administration, email: r.ball@ph.unimelb.edu.au

This work was produced with the assistance of the Australian Research Council under the ARC Centre of Excellence Program. CXS would like to thank Rosslyn Ball for her contribution in writing all of the articles in this newsletter.



## EUREKA!

CXS is proud of its extensive outreach program and in particular its' well established association/relationship with secondary school students, so it was no surprise when a group of St Helena Secondary College students sought further involvement with the Centre via a CXS project.

The six students were given the task of producing a Eureka Sleek Geeks Science prize winner – Secondary School category - to be entred into the Australia Museum's annual Eureka Prize competition.

The video documentary outreach program was funded by CXS and the Victorian Department of Education and Early Childhood Development (DEECD), and developed and delivered by the La Trobe University Outreach Program team during 2008 and 2009.

As the project evolved it was decided to change the initial scope from producing a ten minute video for Year 12 and1st Year Physics students to a three minute video, now titled "What are X-rays?"

The St Helena students; Betty Cheregi, Steven Megaloudis, Matt Dalla Rosa, Paul Dalla Rosa, Evan Raif and Byron Mihailides, who had undertaken Year 10 Work Experience in the Biochemsitry Department at La Trobe University in 2008, were invited to join the project and they decided upon a video re-enactment of the discovery of X-rays with a modern twist.

The students worked collaboratively to understand the science, plan the content, create a storyboard and write a script.

To better understand the science, the students visited the Australian Synchrotron and delved into the scientific research world by interviewing a number of scientists from across Melbourne who work with X-rays.

The project required a large and dedicated group of stakeholders, but the quality of the schools interaction and the final product has ensured the success of the project.
Thanks to all those who contributed behind the scenes to make this project a success. We wish the participants the best of luck for their Eureka Prize entry and now await the outcome.

Byron Megaloudis behind the camera of the Eureka Prize - Sleek Geeks video production

**NEWS JUST IN!**
**The students' entry is now one of the three entries shortlisted.**

**Congratulations!**