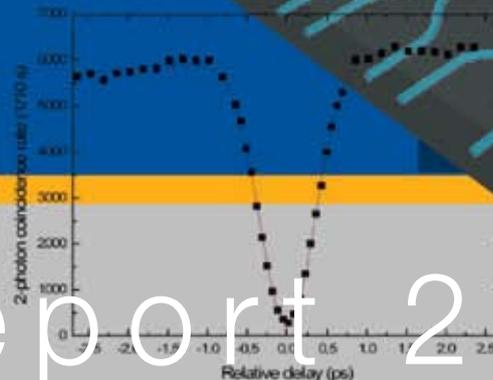
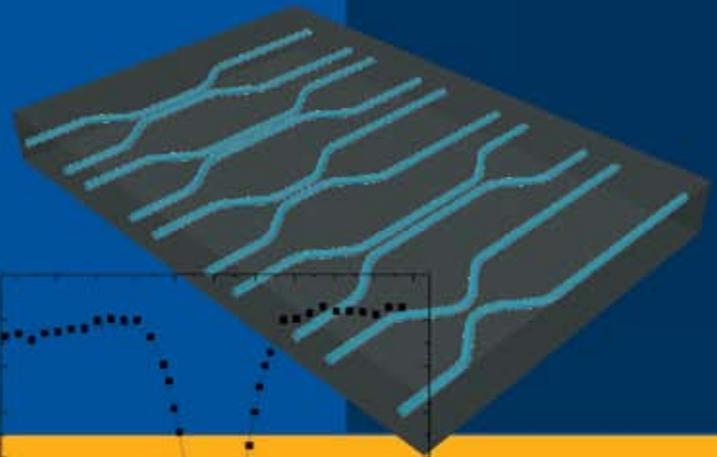
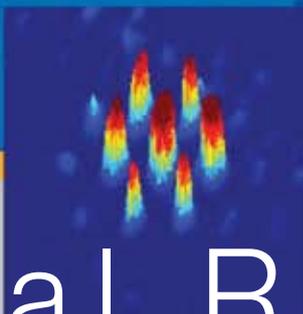
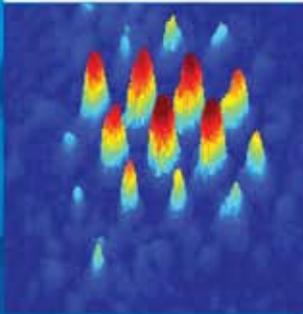
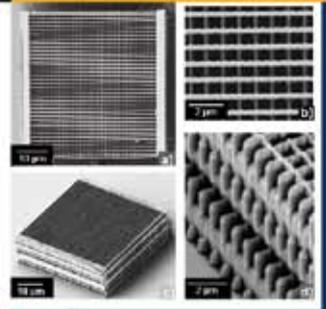
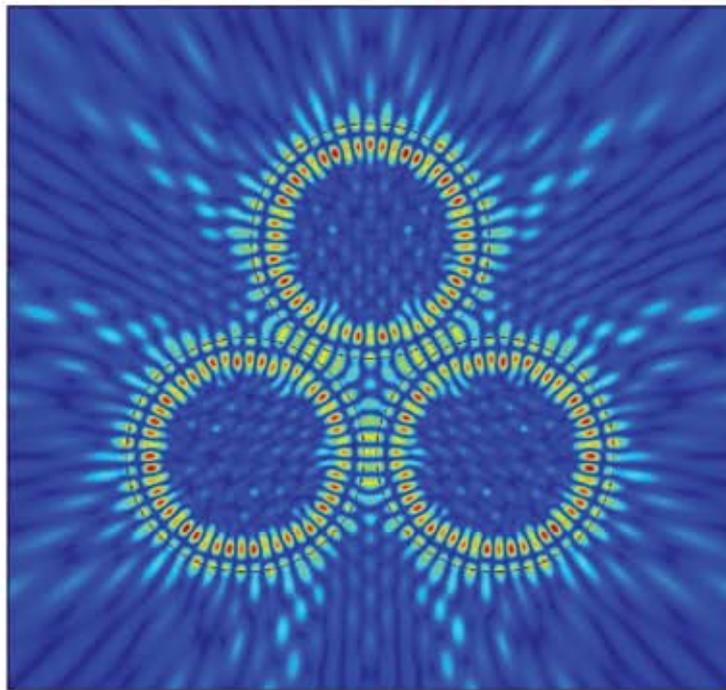
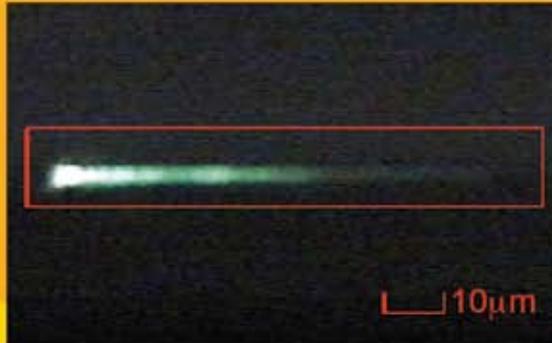


CUDOS

The Centre for Ultrahigh bandwidth Devices for Optical Systems (CUDOS)



Annual Report 2008

Education and Training: Boris Kuhlmeiy



While CUDOS' primary mission is to research novel photonics devices and principles, that research can only be of use to Australia and the world if it is disseminated and understood, not only by the photonics research community but also by students and the general public. Indeed, a technology will only reach the end user if there are engineers and technicians to implement it, if there are entrepreneurs and shareholders understanding enough of it to fund it, and if the general public understands how it can improve their lives. It is thus our collective duty to share the expertise and knowledge we have acquired and we continue to develop. This is why CUDOS maintains a strong commitment to education and training activities, and endeavours to keep up healthy student dynamics. Beyond solely providing research training of local and international postgraduate and undergraduate students, we organize yearly tutorial workshops on hot topics in photonics, have student competitions, strongly encourage outreach activities and student initiatives, and, at the level of

each of the node's universities, contribute to undergraduate and postgraduate coursework.

Tutorial workshop – metamaterials:

In September 2008, we organized a full-day tutorial workshop on metamaterials, novel composite materials gaining extraordinary optical properties from resonant sub-wavelength structuring. The workshop was aimed at our postgraduate students as well as CUDOS-researchers. Over sixty attendees gathered at the Coogee Bay Hotel (no ice-cream was served) for half a day of short lectures on the fundamental concepts behind metamaterials, followed by presentations covering the major achievements and recent developments in the field, in terms of theory, fabrication and characterization. The day concluded with a session on how metamaterials could play a role in CUDOS research. The lectures and talks were given by CUDOS researchers familiar with the field as well as external specialists invited for the occasion. Slides of the lectures and presentation can be found on the CUDOS web site.

Undergraduate and postgraduate coursework

A number of CUDOS researchers hold teaching and research positions or do small amounts of voluntary teaching within their respective universities. This provides a great opportunity to share our expertise, make courses more attractive by including examples of current research, and foster the next generation of photonics researchers and engineers. For example, at Macquarie University Mick Withford gave a full course on Optical Science and Technology. Judith Dawes gave a third year course on optoelectronics, was course director for the Bachelor of Optical Technology and BTech in optoelectronics, coordinated optoelectronics industry project internships and also organized careers evenings. At the Australian National University, Dragomir Neshev lectured on Nonlinear waveguide materials, and included material produced in the frame of the CUDOS student competition in his lectures (see below). At the University of Sydney, David Moss gave lectures on optical data storage and processing, Christian Karnutsch taught solid state device physics, and Boris Kuhlmeiy and Martijn de



Students work and play at the CUDOS Metamaterials Workshop



The Macquarie students team, winner of the 2008 CUDOS Student Competition with judges Dr Mark Butler (right) and Dr Phil Dooley (second from right)

Sterke taught a 4th years physics full course on advanced optical physics and photonics. In collaboration with other colleagues from the University of Sydney, B. Kuhlmeier and C. Walsh initiated a Masters and Graduate Diploma programme in Photonics and Optical Sciences. At RMIT University, 4th year and masters by coursework communication engineering students benefited from many examples of CUDOS research given by Arnan Mitchell in his course on optical fibre technology and by Mike Austin in his course on optical fibre systems.

Student competition

In 2008 CUDOS organized a student competition, for which the challenge was to produce an original outreach presentation aimed at high school or primary school students, that could be used in subsequent years for actual outreach purposes. To win the coveted prize, contestants had to present their outreach demonstration at the CUDOS workshop in front of all attendees and the jury, including multi-award winning high-school science teacher Mark Butler and the University of Sydney's School of Physics science communicator Phil Dooley. Half a dozen student groups entered the competition, with presentations ranging from lively demonstrations of photonic crystals and waveguides using ripple tanks to colourful stop-frame animations. The prize for the best entry was attributed to the CUDOS students of Macquarie University for their entry 'Phrame by Phrame Photonics,' directed and edited by Nem Jovanovic and the Luke Stewart. The film is available on request and has already been used for outreach at a number of high schools locally and internationally.

Student prizes

CUDOS students continue to make us proud with the number of prizes they win locally and internationally. In 2008, Ivan Garanovich (ANU) won the Canon Information Systems Research Australia (CiSRA) Prize, the Best Poster Prize at the 407th. Wilhelm and Else Heraeus Seminar "Discrete Optics and Beyond", [Physikzentrum Bad Honnef, Germany, May 19-22, 2008], the Incubic/Milton Chang Travel Award for Conference on Lasers and Electro-Optics (CLEO) of the Optical Society of America (OSA), as well as the Robert and Helen Crompton Travel Scholarship 2008 from the Research School of Physical Sciences and Engineering, Australian National University. Congratulations to Ivan for a very successful year! Sangwoo Ha (ANU) won the 2008 FiO Outstanding Student

Presentation Award for his presentation on "Observation of slow light tunneling in coupled periodic waveguides" at Frontiers in Optics 2008. Cameron Smith (Usyd) Won second prize for student oral presentation at the IUMRS-ICEM conference in July; Felix Lawrence (Usyd) won the 2nd prize for Best Student Presentation at the OECC/ACOFT conference. Finally, Nem Jovanovich, in addition to leading the Macquarie team winning first prize at the CUDOS student competition, also won the prize for best poster at the CUDOS workshop.

Collaborations

Benefiting from the expertise of staff and students in other CUDOS nodes and in international research centres CUDOS collaborates with is one of the many advantages of being student at CUDOS. Many students are involved (and often supervised) in collaborations between two or several CUDOS nodes, and the trend of increased international collaboration by students which started in 2007 clearly had continued in 2008, with several of our students going overseas for collaborations, and over 16 students from overseas universities staying with us for internships lasting from 3 months to over a year. Outstanding examples of collaborations include Bill Corcoran (Usyd) who collaborated with Dominik Pudo, from MIT, leading to submissions to the prestigious PECS and CLEO conferences, and who is involved in an ongoing collaboration with St Andrews with recent submissions to Optics Express and Nature Photonics; Sangwoo Ha (ANU) who has published joint papers with K. Dossou, and L. Botten from UTS; Ivan Garanovich (ANU), whose very fruitful collaboration with Alexander Szamiet and Thomas Pertsch' group in Jena (Germany) led to three high-impact publications and various prizes; Cameron Smith, who also published two papers in collaboration with Thomas Krauss' group in St. Andrews, Scotland, using silicon photonic crystal samples fabricated at St. Andrews and characterized in Sydney; Nem Jovanovich (Macquarie), who had a two way exchange with Jens Thomas, a PhD student under Stefan Nolte and Andreas Tunnermann from the Friedrich-Schiller Universität in Jena, Germany to work on developing novel large mode area fibre lasers, with publications to appear soon. Nem was also involved in a number of local collaborations outside of CUDOS, in particular with the OFTC and DSTO, leading to four journal publications in 2008.

Student initiatives

Last year, Nem Jovanovich initiated a new OSA student chapter at Macquarie University, and the Macquarie group has been very active organizing talks for undergraduates, lab tours etc. University of Sydney students organized through their own OSA student chapter in 2008 a visit to the facilities of Optium (which reportedly led to one student receiving a job offer there), as well as talks attended by over 70 undergraduate students on optical

switching and cloaking. Amrita Prasad and Khu Vu, ANU CUDOS students doubling as presidents of the ANU OSA student chapter organized two distinguished lectures by Prof. T Baer on 'Advances in Cancer Detection and Diagnosis: the Revolution in Bioimaging and Micro-molecular Analysis,' and Prof. D Moore (OSA president) on 'Gradient-index optics in Nature and Manmade'.



CUDOS Students at the Annual Workshop in (top) 2008 and (bottom) 2009.