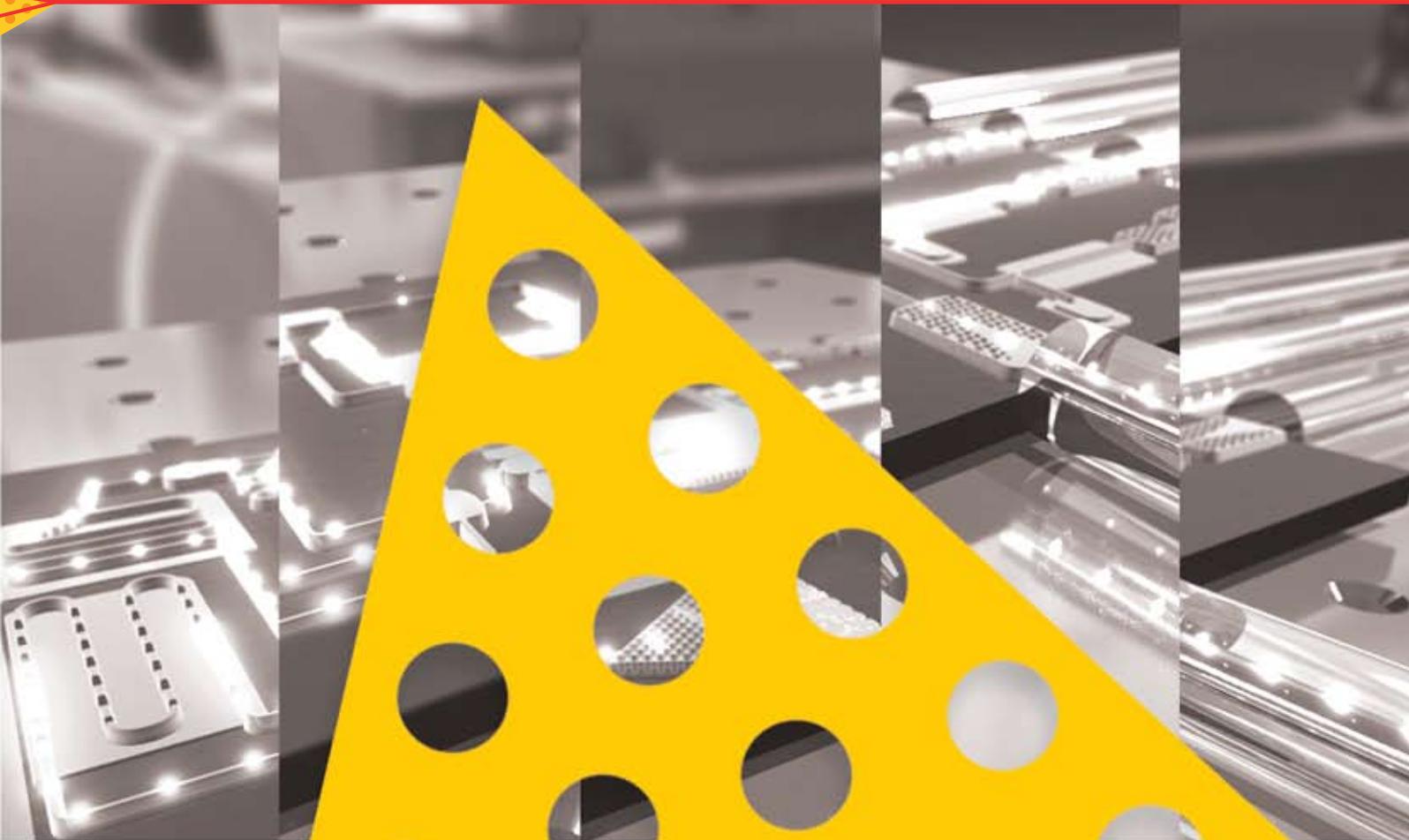




CUDOS

The Centre for Ultrahigh bandwidth Devices for Optical Systems (CUDOS)
An Australian Research Council Centre of Excellence



Annual Report 2007



◀ Boris Kuhlmeier

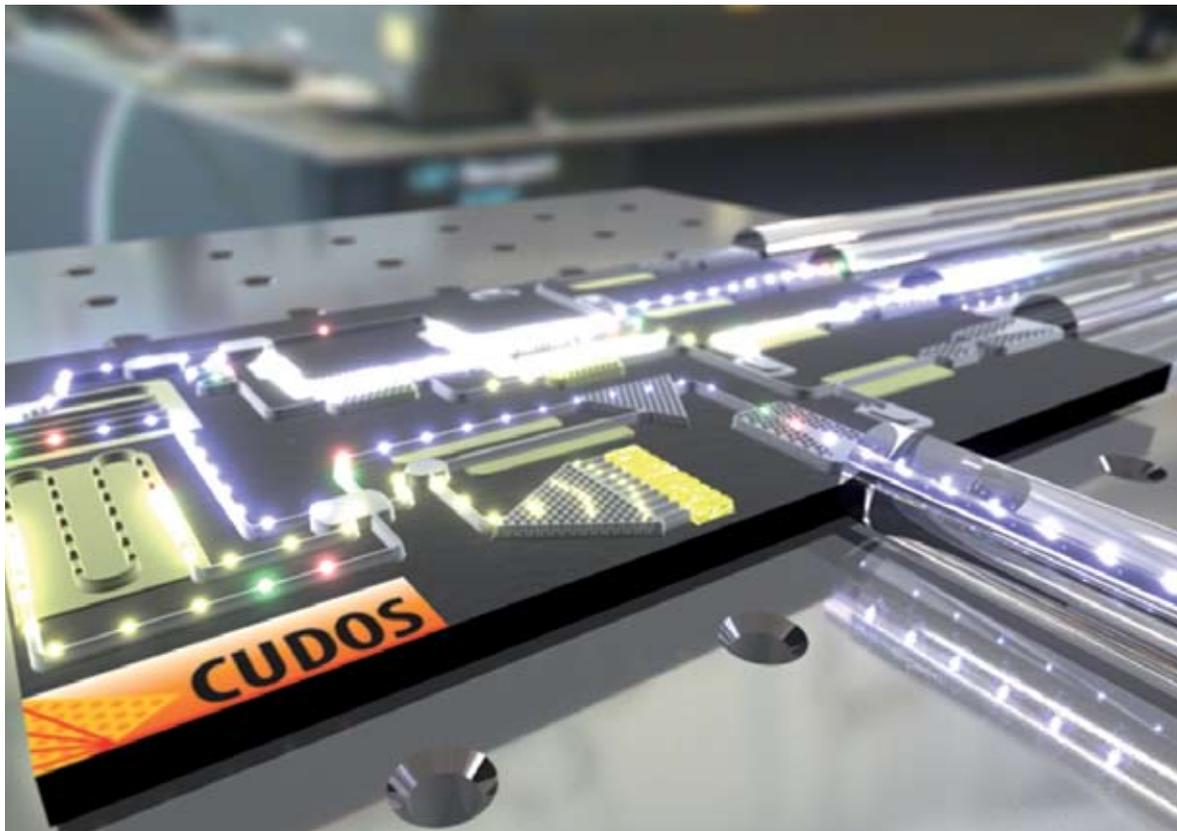
slow light), CUDOS organised a tutorial workshop on all optical switching in September 2007, in Coogee. For the first time, we opened the tutorial workshop to undergraduate 3rd and 4th year physics and engineering students external to CUDOS, with the double aim of educating these students to the promises of all-optical technology, and hopefully recruiting some of them for honours and PhD projects.

For this, we extended the workshop to two days: Day one, aimed at undergraduate students only, consisted of lectures motivating optical switching (telecom networks etc) and introducing the students to the physical concepts underpinning optical switching (waveguiding, optical resonators, non-linear optics). Day two was the actual tutorial workshop aimed at CUDOS staff and students, as well as the invited undergraduate students. It consisted of presentation and discussions on fundamental and practical issues with various implementations of all-optical switching, presentations on the state of the art in optical switching, and discussions on CUDOS' role in this research.

The workshop was advertised across Australian and New Zealand Universities, and over 50 high quality applications were received. We selected the 32 best applicants, and provided travel and accommodation for them to attend the workshop. The workshop was very successful, and several of the students attending the workshop have already enrolled for research projects with CUDOS. Given the very positive feedback from the students and the great success of the workshop, we plan on organizing such mini-schools every second year.

Education and Training (E&T) is an important part of CUDOS – we have a duty to disseminate the expertise required to use, further develop and even market the technology we are creating for next generation photonic telecommunications. 2007 was an exciting year for education and training at CUDOS, with a number of new initiatives. In particular, for the first time we organized a mini-school for undergraduate students from across Australia and New Zealand, coupled to a tutorial workshop on all-optical switching. CUDOS organized student prizes and a student competition yielding impressive visuals to explain CUDOS research. But above all the students themselves were very active, collecting local and international prizes, and having a large number of outreach and other initiatives in particular in the context of OSA student chapters (see also the Outreach section).

Tutorial workshop and mini-school: In line with the popular internal tutorial workshops organised in previous years (lightline,



A still image from the photonic chip movie developed by CUDOS student Sam Campbell and (opposite) Sam receiving his award from Lindsay Botten at the CUDOS Workshop.



Over 30 undergraduate students from around Australia and New Zealand attended the CUDOS tutorial workshop.

Undergraduate courses: Undergraduate courses delivered by CUDOS staff and drawing on CUDOS research have been extended in 2007, and include: a full course (20 lectures) in physics honours year on advanced optical physics and photonics taught by M. de Sterke, B. Eggleton and B. Kuhlmeiy, a full course in 3rd year physics on Optoelectronics delivered by J. Dawes, a full course on optics in 2nd year engineering given by D. Moss, a full course in 3rd year physics on optics given by M. de Sterke, a half course on nanotechnologies by B. Eggleton in 3rd year physics, and several topical lectures for second and third year physics on photonics given by M. Withford and B. Jia as well as a double lecture on photonic crystal fibres by B. Kuhlmeiy. Furthermore, J. Dawes is the course director of the Bachelor of Optical Technology and BTech (Optoelectronics) at Macquarie University and coordinates optoelectronics industry project internships.

Student competition: For the 2007 edition of CUDOS' student competition the students were challenged to create visual artworks (still or animations) illustrating CUDOS research, that could be used for communication with the general media. A number of applications were received, including the outstanding contribution by Sam Campbell (PhD student, Uni. of Sydney) who won first prize. His computer-generated 3D-animation illustrating the various components of a photonic chip has been used in a large number of occasions since, be it for presentations at scientific conferences or during outreach activities, and is featured on the CUDOS website. Darren Freeman (PhD student, ANU) obtained the second prize for an impressive nano-structured CUDOS logo on a chip.

Student prizes: CUDOS students keep making us proud by harvesting a large number of student prizes. At LUCID, an industry event organized at Macquarie University, Dionne Haynes was awarded the Physics prize, while Luke Stewart received the overall People's Choice award. Hong Nguyen was finalist for the prestigious OSA/New Focus Bookham prize, and also received the University of Sydney's Science Faculty Postgraduate academic achievement and outreach prize. Sangwoo Ha was awarded a student travel grant for CLEO/Pacific Rim, and Amrita Prasad received the Wanda Henry Prize for best student presentation at the COIN-ACOFT 2007 conference. Ivan Garanovich was awarded a highly competitive Australian French Association for Science and Technology and the Embassy of France in Australia Science Fellowship 2008 to support his research visit to the group of Prof. J. Dudley in France, received the Dean's Prize 2007 and High Distinction for his seminar in the Graduate Program in Physics Seminar Series 2007, ANU and the Third Prize for the best student talk at 2007 Annual Workshop of the ARC Australian Research Network for Advanced Materials (ARNAM). Finally, he was awarded an ANU Vice Chancellor's Travel Grant to present his results at the CLEO/Europe 2007 conference in Germany. CUDOS student prizes for best poster presentations were awarded at the CUDOS workshop in Murrumbidgee, with Hong Nguyen winning first prize and Amrita Prasad winning second prize.

Collaborations: there are many advantages to being a student at CUDOS, including benefiting from the expertise of staff and students in other CUDOS nodes and in international research centres with which CUDOS collaborates. While the majority of students are involved in collaborations between CUDOS nodes (with many having supervisors from different nodes, see student list) 2007 was a year marked by an increase in international collaborations, with a large number of overseas graduate students coming for short term projects (3 to 6 months), and CUDOS students visiting overseas research facilities. As examples, the ANU received Urszula Laudyn, (Warsaw University of Technology), and Per Rasmussen, (COM*DTU, Denmark) to work on discrete optical solitons in photonic crystal fibres for 6 months; Bernd Terhalle, a PhD (University of Münster), worked for 6 months on non-linear photonic lattices. PhD student Cameron Smith had a collaboration with the Institute of Microstructural Sciences in Ottawa on nanowire coupling into photonic crystal cavities for single photon sources. Cameron Smith and Darran Wu worked intensely with visiting Prof Harald Giessen and the team at St. Andrews on fluid infiltration of photonic crystals. Sangwoo Ha had a very fruitful collaboration on slow light with his colleagues at UTS along with Dimitry Chigrin (Germany) and Andrei Lavrinenko (Denmark). Ivan Garanovich worked with a number of experimentalists within CUDOS (at ANU and RMIT) and also in Germany (Prof. T. Pertsch, University of Jena) to experimentally demonstrate theoretical predictions he made in the course of his PhD. It is worth noting that most of these collaborations have led to one or several joint publications (see publication list).

Student initiatives: CUDOS Students led by Michael Ventura initiated a new OSA student chapter at the University of Swinburne, the third one after ANU and the University of Sydney in Australia to be started by CUDOS students. Amongst the many remarkable initiatives of the OSA student chapter (see also outreach section), one of the most noteworthy is certainly the organization at the University of Sydney by Hong Nguyen and the local student chapter of a Careers in Photonics Forum, with interventions from Dr. Ian Clarke (Optium Australia), Dr. Ross Halgren (Redfern Broadband Networks) and our own Prof. Ben Eggleton.

