



## BANDWIDTH

Video conferencing and telecommunications are heading towards being instantaneous due to research being carried out by young postgraduate student, Trung Duc Vo (right) working as part of CUDOS, the ARC Centre of Excellence for Ultrahigh-bandwidth Devices for Optical Systems, at the University of Sydney's School of Physics. "The growing demand for higher bandwidth is a major motivation behind the push to increase the transmission rate per-channel of optical systems. My research will lead to communication speeds around 100 times faster than the current networks but could be increased by another factor of ten," says Vo, who was first author on an acclaimed paper in which these world-first results were presented in the prestigious post-deadline session at the Optical Fibre Communications Conference recently held in San Diego, USA.

Vo is part of a collaboration with the Australian National University and Danish Technical University that have achieved unprecedented capacity per-channel with efficient bandwidth utilization that could be further enhanced by using advanced modulation formats. Vo is also researching how optical time division multiplexing (OTDM) acts as a method of allowing Tbaud data generation by avoiding the usual electrical-optical-electrical conversion in processing information. "Whereas transistors switch on and off and generate heat, photons hardly heat at all and cooling time is a thousand times faster than electronics," he explains. "Electrical-optical-electrical conversion is like driving in heavy traffic then you hit the freeway and you're zooming along then you take the exit and you're stuck in traffic again.

This is what we're all currently using but 'optics only' is the way of the future. Our approach utilises a photonic chip solution, which is potentially very simple and compact. By using photons and optics only we'll be communicating on the freeway the whole time. It means better communication, more bandwidth yet less energy being used." Professor Ben Eggleton, Director of CUDOS, said, "This result represents another CUDOS record for optical processing. We have demonstrated the feasibility of a Tbaud Ethernet link using a photonic chip that generates the signal at the transmitter and uses the same chip to optically switch the signal at the receiver. This is very exciting research."



## CAREERS WEEK

National Careers Week was held 17-23 May. For information on careers in science, the Faculty of Science has some great information on its website. For more information and to get great tips straight from scientists visit:

## IPOS SYMPOSIUM 1&2 JULY 2010



The 2010 Institute of Photonic and Optical Science (IPOS) Symposium Biophotonics will be a vibrant, multi-disciplinary meeting that will bring together researchers working in fibre and planar biophotonics with researchers in the biological and health sciences. The Symposium is a free, two-day meeting focusing on Biophotonics and designed to bring together photonics and bio-science researchers from IPOS and the wider domestic and international communities.

Chair of the Organising Committee, Dr Peter Domachuk says, "We hope to engender communication between participants to identify areas of collaboration across disciplines, with the aim of advancing research and producing real solutions in the bio-sciences and medicine." The Symposium will be held in Maclaurin Hall on Thursday 1 July and within the School of Physics on Friday 2 July. Registration is essential. Visit: [www.usyd.edu.au/ipos/news\\_events/events/symposium.shtml](http://www.usyd.edu.au/ipos/news_events/events/symposium.shtml)

## BRIGHT STARS

One of the brightest of the University of Sydney's PhD students, Chris Hales (right), is about to travel to Lindau, Germany, to meet with over 60 Nobel Laureates and 700 of the world's most promising science PhD and Post Doc students from 27 June to 3 July 2010. Chris who is a postgraduate student with the Sydney Institute for Astronomy, based within the School of Physics is one of fourteen students who have been selected by the Australian Academy of Science from across the nation to be part of this prestigious program, which started in 1951.

Originally the program was limited to German Nationals but the now international program sees students from all over the globe meeting with Nobel Laureates and each other discuss ideas and make contacts. "I am honoured to be chosen and it's pretty exciting to think I'll be meeting some of these inspirational people in person," says Chris. "The celebrity suddenly thrust on Nobel Prize winners affords many of them the chance to expand their work and talents into wider society; for example, advising Governments on a wide range of issues, or developing science outreach programs that enable people to learn probabilistic reasoning and to see through widespread delusions."

Chris says it's a wonderful opportunity to be able to interact with and learn from such talented and sometimes outspoken individuals. "I'm hoping to meet with as many Laureates and other young scientists as possible."

A PhD candidate Chris is studying the as-yet unknown origin of tenuous large-scale magnetic fields that exist in galaxies like our own Milky Way. By understanding their origin, astronomers will be able to better understand the formation and evolution of stars and galaxies within the cosmic history of our Universe. Only the students with the most promise are selected. In his understated manner Chris says that there were two steps involved to attend the program - the first one to get nominated and the second to be accepted by the Australian Academy of Science. "The Australian Academy of Science then nominated me to the Lindau



## ASTRONOMER AWARDED



Professor Geraint Lewis, an astronomer at the Sydney Institute for Astronomy, based within the School of Physics, has been awarded the prestigious Raymond and Beverly Sackler Distinguished Visitor position at the University of Cambridge's Institute of Astronomy. Professor Lewis will also use his time at the University of Cambridge to build new collaborations and showcase the research of his group at the Sydney Institute for Astronomy. Professor Lewis, who undertakes a broad spectrum of research, will be taking on the position as part of his sabbatical later this year said, "I am very honoured to have been awarded this Distinguished Visitor position and to be given the opportunity to spend some quality research time at one of the world's leading astronomical institutions." Dr Raymond Sackler and his wife, Mrs Beverly Sackler, are international philanthropists who's support at the University of Cambridge led to the establishment of the Deep Sky Initiative, the addition of a Lecture Theatre, and the endowment of a visiting fellowship program of which Professor Lewis is a recipient.

## THANKS!

Did you know with the Foundation's support the School of Physics awards over \$50,000 in prizes and scholarships annually? To all our alumni and friends who have to date donated to the Science Foundation for Physics 2010 winter appeal thank you for your support.

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