



# The Bulletin 357

of

## The Royal Society of New South Wales

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July 2012

### Future Events

Lectures in Sydney are held on the first Wednesday of the month at 6:30pm.

#### August

**Wednesday 1 August 2012 at 6:00pm**  
for a 6:30 start.

**"Photonic circuits for the new information age: faster, smaller, smarter and greener"**

Delivered by Prof Benjamin. J. Eggleton  
*Union, Universities & Schools Club*  
*25 Bent St, Sydney City*

**Please note dress code: Jacket and tie**  
Details at right.

#### Southern Highlands Branch

**Thursday 16 August 2012 at 6:30pm**  
**"Understanding the extent and impact of rubbish in marine ecosystems"**

Delivered by Dr Chris Wilcox, Senior Research Scientist CSIRO Marine and Atmospheric Research Division  
*Performing Arts Center, Chevalier College Bowral*

#### Advance Notice

**Saturday 20 October 2012**

**"Where Art and Science Meet"**

Delivered by Dr Thomas H. Rich, Senior Curator, Museum Victoria.

There is no need to book in advance. After each lecture, members and non-members are welcome to attend a dinner with the lecturer at *The Briars, Burradoo*.

### Wednesday 1 August 2012 1202nd General Meeting

*"Photonic circuits for the new information age: faster, smaller, smarter and greener"* delivered by Professor Benjamin J. Eggleton.



Join us at the lovely Union University and Schools Club in the city for a fascinating talk, delivered by Professor Benjamin J. Eggleton.

Attendees will need to register beforehand. Contact Emma in the Society's office by phone on 02 9036 5282 or by email at royalsoc@royalsoc.org.au.

The Society will be hosting a welcome drink on this occasion from 6 o'clock until 6:30 pm and dinner is available after the lecture at \$70 a head. Registration and payment (for those who want to have dinner) must be made by Tuesday 31 July.

**Please note the Club has a strict dress code of jacket and tie for gentlemen and appropriate similar attire for ladies.**

Professor Eggleton is Professor and ARC Federation Fellow Director, CUDOS ARC Centre of Excellence for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS) School of Physics, University of Sydney [www.cudos.org.au](http://www.cudos.org.au)

He is an international leader in microphotronics and nonlinear optical physics. He is an ARC Federation Fellow and Professor of Physics at the University of Sydney and founding Director of the ARC Centre of Excellence for Ultrahigh-Bandwidth Devices for Optical Systems (CUDOS). He obtained his Ph.D. degree in Physics from the University of Sydney in 1996 and then joined Bell Laboratories, Lucent Technologies as a Member of Staff.

In 2000, he was promoted to Director within Bell Laboratories. His research links fundamental to applied science. He is the author or co-author of more than 320 journal publications with over 9000 citations and an h-number of 47. Prof Eggleton is a Fellow of the Optical Society of America (OSA), IEEE and the Australian Academy of Technological Sciences and Engineering (ATSE).

He has received numerous prizes, including the 2012 Walter Boas Medal from the Australian Institute of Physics, the 2011 Eureka Prize for Leadership in Science, the 2007 Pawsey Medal from the Australian Academy of Science, the 2004 Malcolm McIntosh Prize for Physical Scientist of the Year and the 1998 Adolph Lomb Medal from the OSA. He was President of the Australian Optical Society and is currently Chief Editor for Optics Communications.

*(Continued on page 2)*

#### Patrons of The Royal Society of NSW

Her Excellency Ms Quentin Bryce AC CVO, Governor-General of the Commonwealth of Australia

Her Excellency Professor Marie Bashir AC CVO Governor of NSW

## Abstract

Optical science stands at the edge of a revolution in miniaturisation and integration, directly analogous to the silicon electronics revolution that has reshaped the world over the past 50 years. CUDOS, an ARC Centre of Excellence will take the next big step in optical systems by transforming photonic circuits into a technology that will have a profound effect on economies and lifestyles around the world.

CUDOS will enable the Internet to transfer vast amounts of data with significantly improved energy efficiency; it will lead to secure transmission using quantum photonics-based devices, and to the detection of mid-infrared signatures of light from distant stars and complex molecules of environmental or biochemical importance.

We will achieve this by developing new materials with optical properties to control light and engineering them into miniature photonic processors. The outcomes will fuel R&D programs for decades, harnessing links between fundamental research and commercial applications through industry partners and start-up companies, and developing strong linkages between Australian and overseas universities and companies.



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<https://www.facebook.com/RoyalSoc>

## From the President



The monthly meeting held at the Union University and Schools Club in the Sydney CBD on Wednesday 4 July was successful.

Attendance was more than double the average for the last year. The speaker was particularly interesting – Professor Ian Caterson talked about the obesity epidemic that confronts many countries in the world today, and if left unchecked, will become a global public health crisis over the next few decades.

Following the success of the *Royal Society of NSW Forum 2012*, we are delighted that the **ABC** has given a commitment to support the 2013 Forum. Planning has commenced to make the 2013 Forum a major event in Sydney next year.

We have also begun work to lift public recognition of the Society's highly prestigious awards.

We are most grateful that the Chief Scientist and Engineer of NSW, Professor Mary O'Kane has accepted our invitation to chair a panel to advise the Society's awards committee regarding the nomination and evaluation of our awards.

The awards that will be made this year are:

**The Clarke Medal** – for distinguished work in a natural science done in Australia and its territories. This year the field for recognition is zoology.

**The Edgeworth David Medal** – for distinguished contributions by a young scientist.

**The James Cook Medal** – for outstanding contributions to science and human welfare in and for the southern hemisphere.

**The Warren Prize** – to recognise research of national or international significance by engineers and technologists in their first two decades or so professional practice.

**The Royal Society of NSW Scholarships** – to acknowledge outstanding achievements by early career individuals working in a science-related field.

Please note that the closing date for the awards is 30 September 2012 (31 October for the Warren Prize).

The awards will be presented at the annual dinner early in 2013. If you know someone who might be a contender for any of these awards, please get in touch with Professor Brynn Hibbert, chairman of the awards committee. There are further details on the Society's website at [www.royalsoc.org.au](http://www.royalsoc.org.au).

Unfortunately the Society does not have many members who are active, other than attending meetings.

It would be great to have a larger Council (our Rules provide for up to 10 members of Council). If you would be interested in joining the Council, please get in touch with me at [president@royalsoc.org.au](mailto:president@royalsoc.org.au).

The areas we would particularly like some assistance in are working on our historical assets (we have a large collection of journals and 19th and 20th century books and other historical material) and we would like to put these to good use.

Voluntary organisations always struggle for resources and any assistance that the membership could provide would be greatly appreciated. Even a few hours a month can make a big difference.

**D**onald Hector

### Did you miss the Royal Society Forum on the radio?

Don't worry, you can listen to the podcast any time you like, just click on the link below or type it into your browser and listen at your leisure.

<http://tinyurl.com/cxsvem9>

# Dirac Lecture 2012

## “The Accelerating Universe”



From left to right: Fred Osman, Donald Hector, Brynn Hibbert, Scott Martin, Merlin Crossley, Brian Schmidt, Heinrich Hora, John Hardie

The 2012 Dirac Lecture “The Expanding Universe”, held on 19 July at the University of New South Wales, was a great success.

Over three hundred people attended the lecture delivered by Professor Brian Schmidt, 2011 Nobel Prize Winner, Laureate Fellow at the Australian National University Mount Stromlo Observatory.

Please see page 4 for details of Professor Schmidt’s talk “The Expanding Universe”.



Professor Brian Schmidt

### New Members of the Society

We welcome the following new member to the Society:

Associate Member

- Peggy Knott

For information about membership please contact the Society’s office or visit the Society’s website at

<http://royalsoc.org.au/membership/membership.htm>

### The Australian Institute of Physics NSW Branch 2012 Postgraduate Awards, AGM, guest speaker and Annual Dinner

The NSW AIP Branch will hold its annual Postgraduate Awards Day on **Tuesday 20 November 2012 in the Slade Lecture Theatre, University of Sydney**. Each New South Wales University is invited to nominate one student to compete for the **\$500 prize and Postgraduate medal** on that day. **The Royal Society of NSW will also award the Jak Kelly Scholarship prize of \$500 as a separate award category for this event. Students nominated for the awards will also be invited as guests for the NSW AIP Branch annual dinner that follows the presentations.**

These awards have been created to encourage excellence in postgraduate work, and all nominees who participate in the Postgraduate Awards Day will receive a **special certificate** recognising the nominee’s high standing. Students are asked to make a **20-minute presentation** on their postgraduate **research in Physics**, and the presentation will be judged on the criteria (1) content and scientific quality, (2) clarity and (3) presentation skills.

This event is proudly sponsored by the Australian Institute of Physics, the Royal Society of New South Wales and the CSIRO. Your support of a student nomination is very important by Friday 12th October 2012. Please email the title and abstract of your nominated student presentation by Friday 12th October 2012 to the Awards Day Coordinator: Dr Frederick Osman on [fred\\_osman@exemail.com.au](mailto:fred_osman@exemail.com.au)

### PROGRAM

- 2 – 6pm: Student presentations (Slade Lecture Theatre, University of Sydney)
- 6 – 6.30pm: AGM (Slade Lecture Theatre, University of Sydney)
- 6.35pm: Guest speaker Dr Stephen Bosi: "Stupid Ideas That Worked". (Slade Lecture Theatre, University of Sydney)
- 8 – 10pm: Annual dinner at the Buon Gusto – booking and pre-payment required by Friday 9 November 2012

# Southern Highlands Branch

## Report of July 2012 Meeting

### “The Accelerating Universe” Delivered by Professor Brian Schmidt

2011 Nobel Prize Winner, Laureate Fellow at the Australian National University Mount Stromlo Observatory.

Professor Brian Schmidt opened his lecture to thunderous and prolonged applause as he stood before a huge audience of 200 - 250 people at the Chevalier College Performing Arts Centre, Burradoo, on the evening of July 19. People from all walks of life had come for this extraordinary event. Noticeable in the crowd were numerous senior physics and science students from the College itself.

Brian Schmidt was introduced to the audience by Mr Hubert Regtop, Cresident of the Branch. He described Brian's early life, his raising in Montana and Alaska USA, and his undergraduate degrees in Physics and Astronomy from the University of Arizona in 1989. Under the supervision of Robert Kirshner, Schmidt completed his Masters degree in astronomy in 1992, and his PhD from Harvard University in 1993. In 1994, he and Nick Suntzeff formed the High-Z SN Search team, a group of 20 astronomers on 5 continents who used distant exploding stars to trace the expansion of the Universe in time.

In 1998, two teams, Saul Perlmutter's from the Supernova Cosmology Project, and the High-Z Supernova Search team led by Brian Schmidt and Adam Riess, traced back the expansion of the universe over billions of years. They expected to find that the expansion was slowing down, but instead

they found it was speeding up. The startling discovery was made that more than 70% of the cosmos is contained in a previously unknown form called Dark Energy. Schmidt's lecture described this discovery and explained how astronomers have used observations of the most powerful explosions in the cosmos to trace our universe's history back more than 13 billion years, leading them to ponder its ultimate fate.

In his very detailed and cleverly presented lecture, Schmidt described how he and his team had used Type 1a supernovae, which are individual stars, to measure the Universe. Supernovae are simply stars that explode, but as there is more than one way for a star to explode, there are different types of supernovae. Type 1a supernovae are the explosions of white dwarfs. This is the pinnacle that only a few stars like our sun are able to achieve. White dwarf stars are not made of iron, instead they are composed of carbon and oxygen, so there are still substantial amounts of nuclear energy left in their atoms. As the white dwarf begins to collapse against the weight of gravity, the material is ignited, and rather than collapsing further, this

nuclear blast wave consumes the star in a second, creating an explosion 10 to 100 times brighter than Type II supernovae.

At the end of the lecture and the questions that followed, Brian Schmidt was kind enough to pose with groups of senior students for photographs that will inspire them for many years. He had just completed an exhausting tour of USA with all the fanfare and demands made on Nobel Prize winners, and had come directly to the Southern Highlands from delivering the Dirac lecture earlier in the day in Sydney. Although he had still to get back to Sydney after the Southern Highlands lecture, he gave his time generously to the students – a wonderful act of advocacy for the sciences and scientific careers.

**A** nne Wood

#### Royal Society of NSW Ties

Every purchase helps support the Society.  
Contact the Society's office for an order form.  
Just \$40.00 plus postage & handling.

### Contact your office bearers

<b>Dr Donald Hector President</b>	<b>02 9484 9007</b>	<b>Prof Heinrich Hora Vice President</b>	<b>02 4627 7769</b>
<b>Mr John R Hardie Vice President</b>	<b>02 9363 9630</b>	<b>Prof D. Brynn Hibbert Vice President</b>	<b>02 9398 9134</b>
<b>Mr David Beale Hon. Treasurer</b>	<b>02 9498 1503</b>	<b>Mr Tony Nolan OAM Hon. Librarian</b>	<b>0417 270 664</b>
<b>Mr Brendon Hyde</b>	<b>02 9498 3520</b>	<b>Dr Frederick Osman</b>	<b>0418 444 477</b>
<b>Mr Clive Wilmot (SHB rep)</b>	<b>02 4886 4199</b>	<b>A/Prof Maree Simpson (C/W Branch)</b>	<b>02 6365 7818</b>
<b>Professor Richard Banati</b>	<b>0408 121 362</b>	<b>Dr William Kneprath</b>	<b>02 9581 6000</b>

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