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# The Royal Society of New South Wales Bulletin and Proceedings 344

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## Future Events 2011

Lectures in Sydney are held on the first Wednesday of the month.

Friday 29 April 2011 at 11am  
Contact Fred Osman 0418 444 477

### **Dirac Lecture** **Beauty and Truth: Their** **Intersection in Mathematics** **and Science**

**Lord Robert May, Oxford University**  
Leighton Hall, Scientia Building,  
University of New South Wales -  
Registration required & RSVP essential.

Wednesday 4 May 2011 at 6.30pm

### **Heading Towards the** **World's Largest Telescope -** **The Square Kilometre Array** **Professor Michael Burton - School** **of Physics, University of New South** **Wales**

Eastern Avenue Auditorium, University  
of Sydney.

Tuesday 17 May 2011

### **Nuclear Power for Australia** **- Outline of the Key Issues** **Mr John Carlson - Australian** **Safeguards and Non-Proliferation** **Office (ASNO)**

ANSTO Visitor Centre, New Illawarra  
Road, Lucas Heights  
6pm for tour of ANSTO's Research  
Reactor, 7pm for lecture. Registration  
required & RSVP essential.

### **Central West Branch**

For further information please  
contact Kerry Madden at Charles Sturt  
University Orange on Tel: 02 6365  
7500.

### **Southern Highlands Branch**

Meetings are held on the third Thursday  
of each month in the Drama Theatre at  
Frensham School, Mittagong (enter off  
Waverley Parade), at 6.30pm.

## **Heading Towards The World's Largest Telescope - The Square Kilometre Array**

**Professor Michael Burton**

**School of Physics, University of New South Wales**

Wednesday, 4 May 2011 at 6:30pm, Eastern Avenue Auditorium, University  
of Sydney **\*\*Note new time and venue\*\***

Radio telescopes can be used to detect some of the weakest signals that nature produces, signals that have travelled across the universe to reach us, created by events such as the formation of stars, galaxies and even the universe itself. Collecting, analysing and interpreting such signals presents one of the greatest scientific challenges before us. Technology now allows us to take the next step in this exploration of the universe, to build a radio telescope with one hundred times the collecting area of the current generation of telescopes, covering a full square kilometre of collecting area. The dishes themselves would be spread out over an area the size of a continent. The telescope will be known as the Square Kilometre Array or SKA. One crucial factor that limits our ability to measure the faintest radio waves is artificial interference, created by the myriad of communication devices our civilisation now uses. Australia, with its vast areas of sparsely populated land, has the lowest radio interference environment of any country, making it a prime contender for the siting of this telescope. This talk will describe the background to the SKA, why it is being built, some of the science questions it will tackle, and the significant progress now being made towards building what will become the world's largest telescope.



Michael Burton is an astrophysicist at the University of New South Wales. His speciality is studying how stars form, in the cold, dark clouds of interstellar space. Here he uses millimetre-wave radiation, the very highest energy radio waves, to measure the emission from the rich molecular soup that these clouds are comprised of. He has also been a pioneer in the development of astronomy in Antarctica, where the extreme dry and cold conditions open up new windows into space in the infrared portion of the spectrum. For his day job Michael lectures undergraduate students on the wonders of physics.

Booking is not necessary. All welcome. Entry is free to RSNSW members. There is a charge of \$5 for non-members.

### **Patrons of The Royal Society of NSW**

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

**Her Excellency Professor Marie Bashir AC CVO**  
**Governor of NSW**

## Discussion between Barry Jones and David Malouf

Meeting held on Wednesday 6 April 2011

Belief and science: the belief/knowledge dilemma

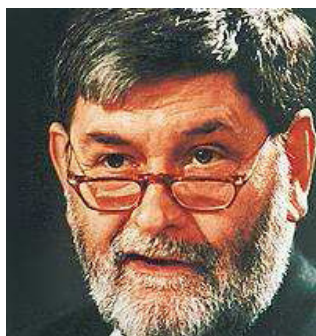
Have scientists become polarised into the believers and non-believers? Barry Jones posed this question to David Malouf and members of the Society at our meeting on Wednesday, 6 April 2011. Reflecting upon this, Barry referred to the scientific paradigm that has emerged over the last several hundred years: scientists gather information in order to try to make sense of observed phenomena using rational analysis. Science has evolved to become not so much a matter of belief but rather of acceptance of the most sensible explanation based on the accumulation of evidence. Nonetheless, when major paradigm shifts in scientific thinking take place, there are often eminent experts who disagree and refuse to accept the new theory. This slows down the acceptance of a new paradigm but ultimately in most cases rational thought prevails.



David Malouf

David Malouf pointed out that non-scientists have to rely on what they are told in order to evaluate scientific theories. He pointed out the significant shift since the 18th century when early scientists put their theories to learned academies (such as the Royal Society, London) for expert examination and they determined what was accepted as scientific knowledge and what was rejected. Today, however, with the highly complex issues that society faces there are significant public policy implications that need to be resolved based on expert advice. But what do we do when the experts disagree? We are largely dependent on the media to inform us. This is further

complicated because important issues are usually not just scientific in their nature but often have economic and social imperatives that commercial groups, governments and other interests seek to manipulate. Barry commented that the sheer complexity of science has forced scientists to increasing specialisation. Furthermore, scientists are heavily reliant on research grants from government and private enterprise and this has discouraged them from entering into controversies. This is quite different to the era of only 50 or 70 years ago when renowned scientists were not afraid to comment outside their area of specific expertise.



Barry Jones

David referred to the great advances that were made in the 17th, 18th and 19th centuries, for example, by Kepler, Newton, and Darwin. Darwin's book, "On the Origin of Species" was very readable but most science in the 20th century has become so complex that it is not able to be so readily accessible to the layman. Furthermore, whereas once scientific advances were often made by one person, nowadays it is far more likely for the work to be attributable to a team of scientists and it is often the "front man" who gets the Nobel Prize! Science is often seen to be different from other subjects but that is not really the case – it just requires a different mindset. Barry referred to the mindset underlying creationism in the US, pointing out that often a deep-seated belief cannot be shaken by debate and discourse. Nonetheless, articles on science and the relationship between science

and belief in popular magazines and newspapers are important. Writers like Richard Dawkins and Stephen Hawking had not only popularised science but through their lucid writing had brought important arguments to a large public audience.

In their final comments, Barry emphasised that the task of a scientist is to analyse inconceivably complex data and make sense of it but the public policy imperatives are driven by media outcomes and necessarily requires the debate to be simplistic. David is fascinated by the rate of change of technology and almost unexpectedly has come to the realisation that the more we know about the complexities of nature, of the human body, the weather and so on, it simply exposes ever more questions. Science has been enormously successful and exciting in bringing an understanding in a world that we know so little about.

### The Society's Council for 2011/12

The Royal Society of NSW would like to announce that the following have been elected to the Society's Council for 2011/12:

(For their exact positions and contact details please see the last page of this bulletin.)

#### Council:

John R Hardie, Clive Wilmot, Prof Heinrich Hora, Prof D. Brynn Hibbert, Dr Don Hector, Dr Bill Kneprath, Tony Nolan OAM, Brendon Hyde, Dr Fred Osman, A/Prof W (Bill) A. Sewell, Prof Bruce A Warren

#### Central West Branch:

The following were elected at the Branch's AGM held on 31st March.

Dr Murray Fletcher, Dr Yann Guisard, Assoc. Prof. Maree Simpson, Dr Scott Andrew.

## Joint Meeting with the Australian Institute of Physics

On Tuesday 22 March 2011, the Australian Institute of Physics and the Royal Society of New South Wales held its annual two societies meeting of the year at the University of Sydney and featured Dr Ragbir Bhathal on his topic of Searching for very fast light flashes. Ragbir is the Project Director of the OZ OSETI Project, the longest dedicated search for ETI in the optical spectrum in the Southern Hemisphere. He is considered the Father of SETI in Australia. He is an academic staff member of the School of Engineering at the University of Western Sydney and teaches engineering physics, project management, and radio and satellite communications. His research interests are in astrophysics, physics, physics education and Aboriginal astronomy. He has published several papers in international journals and 15 books, six on astronomy and has been a recipient of various awards that included the 1988 Royal Society of NSW Medal for services to science and research.



**From left to right: Dr Frederick Osman, Professor Heinrich Hora, Dr Ragbir Bhathal and Mr John Hardie**

He opened his talk by saying that we should be searching for nanosecond laser pulse from ETI. Dr Bhathal believes that ETI would have surpassed the microwave threshold and gone on to use laser pulses for intergalactic communications. A nanosecond laser pulse has several advantages, he said. Apart from its directivity, a 1015 W or more nanosecond laser pulse would outshine its star by four to seven orders of magnitude. This pulse could thus be easily detected by present day optical

telescopes equipped with fast response PMTs or APDs. Because the telescopes are being used as photon buckets they need not be highly sophisticated. The fact that the National Ignition Facility in the US has been able to generate 1015 W laser pulses although for a few nanoseconds lends credibility to the use of lasers as communication devices by ETI civilisations. The optical search strategy has been used in a dedicated mode only for the last ten years. Four groups, three in United States (Harvard University/ Princeton University, University of California and the SETI Institute) and one in Australia (OZ OSETI Project at the University of Western Sydney) have led the charge for the optical search strategy.

Dr Bhathal's optical search is the longest dedicated optical search in the Southern Hemisphere. Last year a group of Japanese scientists and engineers also joined the optical and microwave searches. However, to date no positive signals in the optical spectrum have been received. Although a laser look alike signal was detected in 2008 by Dr Bhathal emanating from the globular cluster 47 Tucanae it was dismissed after a six month search in the same region failed to detect the signal again. Considered as the Father of SETI in Australia, Dr Bhathal hopes to continue the optical search with a new dedicated one metre telescope which is on the drawing boards at the moment. Dr Bhathal also discussed the latest developments in the microwave search strategy which clocked 50 years last year and other programs which are underway for searching for life in the universe, such as searching for glycine, searching for earth like planets by extra-solar planet scientists and the Kepler mission, the Mars explorations and meteorites.

He ended his lecture by quoting from the great 19th century mathematician and physicist Karl Gauss who said that the detection of a signal from ETI "would be greater than the discovery of America". The Australian Institute of Physics and the Royal Society of New South Wales thank Dr Ragbir Bhathal for his

outstanding lecture!

*Dr Frederick Osman – AIP NSW Branch Secretary & Chair of the Publicity committee of the Royal Society of NSW.*

## From the President



Welcome to another Society year! Our year begins with the Annual General Meeting and ends with the following one. This year we plan to undertake some significant reform and begin some important initiatives to enable the Society to engage more widely. We plan to further improve the Journal by expanding the Editorial Board to cover a wider range of disciplines and thereby increase the number of papers submitted, and also engage with universities to position the Journal as suitable launching pad for new researchers.

We have embarked upon the creation of a separate journal specifically devoted to meeting the research aspirations of the highest achievers in high schools. We expect Archimedes, as it will be called, to receive significant support from schools themselves and be self-sustaining.

With the election of an Honorary Librarian, we now have an opportunity to do much with our

## New Members

Two new members were announced at the March meeting of the Society:

Rosemary Cowley – Full Member  
Richard Bela Banati – Full Member

We welcome them into the Society.

valuable collection. The work has already begun and will build on the work undertaken several years ago under our two Community Heritage Grants.

Other initiatives include the revamping of our website, the results of which you will see shortly, and the development of an engagement strategy with social networking technology, particularly if this will result in the development of interest in our work among young people.

In order to guide all this activity we will be holding a strategic planning session, now rescheduled for May. This will produce a plan which will guide us through the next five years.

I would like to thank the outgoing Council members for all their work. The Society has benefited enormously from their input. I would also like to welcome those new to Council and encourage them to be bold in looking for new ways in which the Society might serve its Members and the wider community.

The success of the David Malouf/ Barry Jones event on 6 April leads me to believe that more of this type of event should be contemplated by the Society. We need to ensure that we are all the time relating to our original purpose, which is to promote knowledge in science, art, literature and philosophy. The Dirac Lecture by Lord May on 29 April is another of those special events which fall into that category and I encourage all Members to attend. We also welcome the opportunity Lord May's presence in Sydney gives us to have our Patron,

Professor Marie Bashir, formally invest him with Fellowship of the Society on the same day.

John Hardie

### From the Hon. Librarian



Greetings, my name is Tony Nolan, and I am your new honorary librarian. I feel that there needs to be two parts to this role. The first is to start to get the collection catalogued, shelved under Dewey Decimal Classification, and the catalogue will be available through the National Library's online catalogue. This is the easiest way to make a searchable list of our holdings available to our members at minimum cost, and delay. I see the second part of the librarian's role, is to bring new electronic resources to the membership's attention, in both this bulletin, as well as a library bulletin to hopefully be published in the not too distant future. My intention is to find open source resources, which fit within the Society's areas of interest, and which are free for our members to access. As an example, the following

are the types of resources I am hoping to bring to your attention.

The Conversation is available at <http://theconversation.edu.au/>. The Conversation is an independent source of information, analysis and commentary from the university and research sector – written by acknowledged experts and delivered directly to the public. As professional journalists, we aim to make this wealth of knowledge and expertise accessible to all.

We aim to be a site you can trust. All published work will carry attribution of the authors' expertise and, where appropriate, will disclose any potential conflicts of interest, and sources of funding. Where errors or misrepresentations occur, we will correct these promptly.

Another resource is the Directory of Open Access Journals <http://www.doaj.org/>. The aim of the Directory of Open Access Journals is to increase the visibility and ease of use of open access scientific and scholarly journals thereby promoting their increased usage and impact. The Directory aims to be comprehensive and cover all open access scientific and scholarly journals that use a quality control system to guarantee the content. In short a one stop shop for users to Open Access Journals.

Please feel free to email me with any questions or suggestions. I hope you enjoy these resources. Until next time!

Tony Nolan

[tony@g3n1u5.com](mailto:tony@g3n1u5.com)

#### Contact your office bearers

John R Hardie President	02 9363 9360	Prof Heinrich Hora Vice President	02 4627 7769
Clive Wilmot Vice President	02 4886 4199	Prof D. Brynn Hibbert Vice President	02 9398 9134
Dr Bill Kneprath Hon Secretary (General)	02 9639 3878	Dr Don Hector Hon Secretary (Editorial)	02 9484 9007
Tony Nolan OAM Hon Treasurer / Librarian	0417 270 664	Brendon Hyde	02 9498 3520
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