



# The Bulletin 395

The Royal Society of New South Wales

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27 January 2016

## For Your Diary:

Southern Highlands Branch

Dr Charley Lineweaver

**Death and Nothingness:  
Why did Death Evolve?**

**Why is there Something  
Rather than Nothing?**

Thursday, 18 February 2016

6:30 pm start

The Performing Arts Centre,  
Chevalier College, Bowral

**Four Societies Meeting**

**Prof. Robert Clark**

**Energy Sources in Australia's Future**

Thursday, 25 February 2016

5:30 pm for 6 pm start

47th Floor MLC Centre

See page 5 for more information

**1241th OGM**

**Dr. Len Fisher**

**Communicating Science**

Wednesday, 2 March 2016

6 pm for 6:30 pm start

Union, Universities & Schools Club

25 Bent Street, Sydney

*See Page 6 for a summary of*

*Events scheduled so far for 2016.*

**Patron of The Royal Society of NSW**  
His Excellency General The Honourable  
David Hurley AC DSC (Ret'd)  
Governor of New South Wales

**OPEN LECTURE & 1240<sup>th</sup> OGM**

**Wednesday, 3 February 2016**

## **RSNSW Scholarship Awards**

This special event celebrates the work of three outstanding young researchers. They are each a candidate for an advanced degree in a science-related field within New South Wales or the Australian Capital Territory. Each award winner will speak about their work:

**Adrian W. Dudek** (Australian National University)  
“Problems and Prime Numbers”

**Charles Foster** (The University of Sydney)  
“How Old Are Flowers? A Phylogenomic Investigation of the Angiosperm Evolutionary Timescale”

**Yevgeny Stadnik** (The University of New South Wales)  
“Manifestations of Dark Matter and Variation of Fundamental Constants in Atoms and Astrophysical Phenomena”

*Union, Universities, & Schools Club, 25 Bent St, Sydney*

*6:00 for 6:30 pm, Welcome drink at 6:00 pm*

*Fellows & Members \$5; Guests, \$20*

*Please note dress code: jacket and tie*

All are welcome. To reserve a place, email the Society at

[royalsoc@royalsoc.org.au](mailto:royalsoc@royalsoc.org.au)

**Go to Page 3 for more information about this event**



# From the President

We expect this will bring further depth and richness to our programme and a much more vibrant and diverse audience to our events.

of technical issues that we felt should be resolved before it became live. We hope that this will take place in the next two or three weeks.

I hope you and your families had a relaxing and enjoyable festive season. The Council is very enthusiastic about the programme for 2016. The Events Committee has put together an excellent programme, including another Forum later in the year, following on the great success of last year's programme. We hope that this will include some or named lectures and will probably take our programme to average two events per month. There should be something for all interests!

The White Paper that was completed in the last couple of months of 2015 was circulated to the membership just before Christmas and is the basis for our operational plan this year. The Society has been very successful at attracting new Members and Fellows and we anticipate that this will be a cornerstone of our activities in 2016.

The Annual General Meeting will take place in the first week of April and the Council would like to encourage anyone in the Society who is interested in contributing either on Council or committees to put their name forward. It's always a challenge for not-for-profit organisations to get capable people who are willing devote the time on a pro bono basis but we have been very fortunate in the last few years to have a number of very capable people join the Council and work in other areas on various projects. Nonetheless, we need to ensure that this continues, particularly as our membership numbers grow. If you would like to discuss how you might contribute, please contact or any of the Council members.

We anticipated introducing the new website before Christmas but during final testing we encountered a couple

I look forward to seeing you at the February meeting for the first meeting of the year – our practice of starting with the presentations from the previous year's Royal Society of NSW Scholarship winners is a great way to begin! As always, I am easily contacted by email at [president@royalsoc.all.au](mailto:president@royalsoc.all.au) and would like to hear from you.

Don Hector

## Webmaster Needed

Further to the President's announcement of the new website, the Society would welcome a volunteer to be its webmaster. It would be desirable, but not essential, to have experience in the *Joomla* system. The webmaster would be primarily tasked with ensuring the smooth integration of content into the website as the material comes to hand. For further information, please contact, Dr. Don Hector, the President at [president@royalsoc.org.au](mailto:president@royalsoc.org.au)

## Contacts for Your Officer Bearers and Council Members

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For further information: <http://www.royalsoc.org.au/>

# RSNSW Scholarship Winners



**Adrian Dudek**

“Problems and Prime Numbers”

Since ancient times, the prime numbers have attracted the attention of curious mathematicians (and other characters) for one reason: it's extraordinarily difficult to answer questions regarding the primes. For instance, if you were to write down a list of the first 100 prime numbers, you would not be able to find an intelligible pattern. That being said, some recent spectacular advances in number theory mean that the prime numbers are becoming less elusive and more understandable. In this talk, I will recount some of the history of this ancient branch of mathematics, whilst describing some of my own results in this area.

Adrian Dudek's work in the field of number theory is supervised by Dr. Timothy Trudgian at the Australian National University.



**Charles Foster**

“How Old Are Flowers? A Phylogenomic Investigation of the Angiosperm Evolutionary Timescale”

Resolving the evolutionary timescale of flowering plants (Angiospermae) is crucial for understanding how these plants came to dominate habitats globally, and how this shaped the evolution of other organisms. In the absence of fossil data for many angiosperm lineages, molecular dating provides an important tool for estimating the evolutionary timescale of this group. Differences in sampling of taxa, genes, and fossil calibrations, along with the use of different molecular dating methods, have led to widely disparate date estimates. By analysing chloroplast genomes from 195 taxa with 37 fossil calibrations, and testing the sensitivity of our results to a range of priors and evolutionary models, I have provided the most comprehensive *(Continued on next page)*

# RSNSW Scholarship Winners (continued)

*(Charles Forster – continued from previous page)*

combination of analyses of the angiosperm evolutionary timescale so far. The results I have obtained reflect the increasingly common finding that molecular dating estimates predate the oldest fossils by a non-trivial amount of time, up to 70 million years when considering mean estimates.

Charles Forster's work in botany is supervised by RSNSW Edgeworth David Medallist, Prof. Simon Ho at The University of Sydney.

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## **Yevgeny Stadnik**

“Manifestations of Dark Matter and Variation of Fundamental Constants in Atoms and Astrophysical Phenomena”

Astrophysical observations indicate that 85% of the matter content in the Universe is due to dark matter, the identity and properties of

which remain a mystery. Recently, our group at UNSW has proposed new, high-precision methods to directly detect dark matter using table-top experiments in the laboratory. In my talk, I present an overview of some of our recently proposed methods and breakthrough results that have been obtained using these methods, as well as ongoing efforts with a number of experimental groups and collaborations from around the world to search for dark matter at an unprecedented level of accuracy using our proposed new methods.

Yevgeny Stadnik's research in astrophysics is supervised by Scientia Professor Victor Flambaum FRSN at the University of New South Wales.

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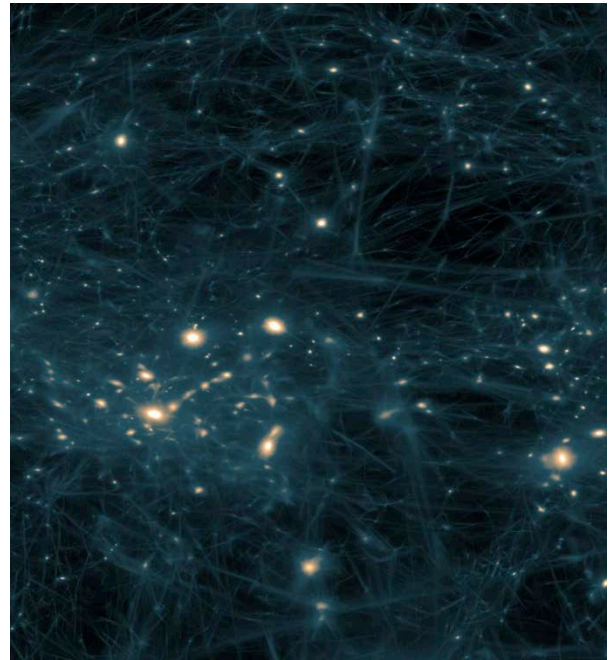


Image of dwarf galaxies from NASA's Fermi Gamma-ray Space Telescope searching for signals from hypothetical dark matter particles.



**ENGINEERS  
AUSTRALIA**  
Sydney Division



**Australian  
Nuclear  
Association**

## **ANNUAL MEETING OF THE FOUR SOCIETIES**

The Royal Society of New South Wales  
The Australian Institute of Energy  
The Nuclear Engineering Panel of the Sydney Branch of Engineers Australia  
The Australian Nuclear Association

### **“Energy Sources in Australia’s Future”**

**Professor Robert Clark AO FAA FRSN**  
Chair of Energy Strategy and Policy, UNSW



**Date: Thursday February 25<sup>th</sup> 5:30 for 6:00 pm start**

**Venue: Hamilton and Parkes Rooms, Level 47, MLC Centre, King and Castlereagh St.**

Entry: Free

Registration (Optional): [royalsoc@royalsoc.org.au](mailto:royalsoc@royalsoc.org.au)

Professor Clark’s talk will focus on Australia’s energy policy and, more broadly, the global issue of climate change. He will consider the technical, economic and social issues surrounding alternative energy sources and explore where the balance might be found.

Professor Clark was appointed Professor and Chair of Energy Strategy and Policy at UNSW in 2012. Prior to this appointment Professor Clark held the position of Chief Defence Scientist and CEO of the Defence Science and Technology Organisation. He has twice been awarded the Australian Government’s Federation Fellowship, is a Fellow of the Australian Academy of Science and was awarded the Eureka Prize for Leadership in Science for his pioneering work in nanotechnology and quantum computing and the Boas Medal of the Australian Institute of Physics. In the 2013 he was appointed an Officer in the Order of Australia for distinguished service to science and technology.

## Schedule of RSNSW Events 2016

Date	Event/Location	Speaker	Topic
03-Feb-16	<b>1240th OGM</b> Union, University & Schools Club	RSNSW Scholarship Award Winners	Prime Numbers, Plant Evolution, and Dark Matter
25-Feb-16	<b>Four Societies Meeting</b> 47th Floor MLC Centre	Prof. Robert Clark	Energy Sources in Australia's Future
02-Mar-16	<b>1241th OGM</b> Union, University & Schools Club	Dr. Len Fisher	Communicating Science
16-Mar-16	<b>Joint Meeting with AIP</b> Trinity Grammar School	Prof. Ron Grunstein	"From Snoring to Somnambulism – The Mystery of the Sleeping Brain"
06-Apr-16	<b>AGM + 1242nd OGM</b> Union, University & Schools Club	Dr. Don Hector	Presidential Address
TBA	<b>Clarke Memorial Lecture</b> Union, University & Schools Club	TBA	TBA
04-May-16	<b>Annual Dinner</b> Union, University & Schools Club	Prof. Eugenie Lumbers	Science Policy and University Research
01-Jun-16	<b>1243rd OGM</b> Union, University & Schools Club	Prof. Peter Hiscock	Archaeologists in Film
06-Jul-16	<b>1244th OGM</b> Union, University & Schools Club	Prof. Itai Ianev	From Sand and Rice Bubbles to Earthquakes and Volcanos
03-Aug-16	<b>1245th OGM</b> Union, University & Schools Club	Mr Jimmy Turner, Royal Botanic Garden	TBA
07-Sep-16	<b>1246th OGM</b> Union, University & Schools Club	Mr Richard Neville, State Library of NSW	History of the Society
05-Oct-16	<b>1247th OGM</b> Union, University & Schools Club	Mr Rob Young	WB Clarke Biography
02-Nov-16	<b>1248th OGM: Jak Kelly Award</b> Union, University & Schools Club	Prof. E. James Kehoe	Courses for Horses: Advances in Instructional Design
17-Nov-16	<b>AIP Postgraduate Awards Day</b> Slade Theatre, University of Sydney	TBA	TBA
07-Dec-16	<b>1249th OGM: Jak Kelly Award</b> Union, University & Schools Club	TBA	TBA

## Southern Highlands Branch - 2016 (So Far)

Date	Event/Location	Speaker	Topic
18-Feb-16	<b>Lecture (See Below)</b> The Performing Arts Centre, Chevalier College, Bowral	Dr. Charley Lineweaver	Death and Nothingness: Why did Death Evolve? Why is there Something Rather than Nothing?
12-Mar-16	<b>Special Event</b> The Performing Arts Centre, Chevalier College, Bowral	Dr Christian Heim and Dr Caroline Heim	An Afternoon with Chopin and George Sand
17-Mar-16	<b>Lecture</b> The Performing Arts Centre, Chevalier College, Bowral	TBA	TBA
21-Apr-16	<b>Lecture</b> The Performing Arts Centre, Chevalier College, Bowral	Prof. Gordon Parker	TBA

*Future lectures and other events will be scheduled, usually for the third Thursday in each month*

### Death and Nothingness: Why did Death Evolve? Why is there Something Rather than Nothing?

Dr Charles H. Lineweaver

Thursday, 18 February 2016, 6:30 pm, The Performing Arts Centre, Chevalier College, Bowral

Charley Lineweaver is Professor in the Research School of Astronomy and Astrophysics and Earth Sciences at ANU and also Senior Fellow at the Planetary Science Institute at Mount Stromlo Observatory. He obtained his first degree in physics from Ludwig Maximilians Universitat, Munich, Germany and his Ph.D in Astrophysics from the University of California at Berkley. He was a member of the COBE satellite team that discovered the temperature fluctuations in the cosmic microwave background. Before his appointment at ANU he held a post-doctoral position at Strasbourg Observatory and the UNSW, where he taught one of the most popular general studies courses "Are We Alone?" His research areas include cosmology, exoplanetology, and astrobiology and evolutionary biology.