The Royal Society OF VICTORIA
Promoting science since 1854

PATRON: The Hon Linda Dessau AM
Governor of Victoria

PRESIDENT: Dr William Birch AM

Headlines…

12th October: Ada Lovelace Day: Celebrating Women and Girls in STEM

13th October: Dark Matter: A Southern Hemisphere Perspective

14th October: Growing Tall Poppies Symposium

27th October: Carbon Sequestration: are Deep Coal Seams the Answer?
Featuring Phillip Law Postdoctoral Award for the Physical Sciences winner, Dr Samintha Perera (Lecture & Presentation)

November Advance Notice:

10th November: Communicating Science: Dr Andi Horvath

24th November: Very Young Scientists: Celebrating STAV Science Talent Search RSV Bursary Winners

October 2016 Newsletter

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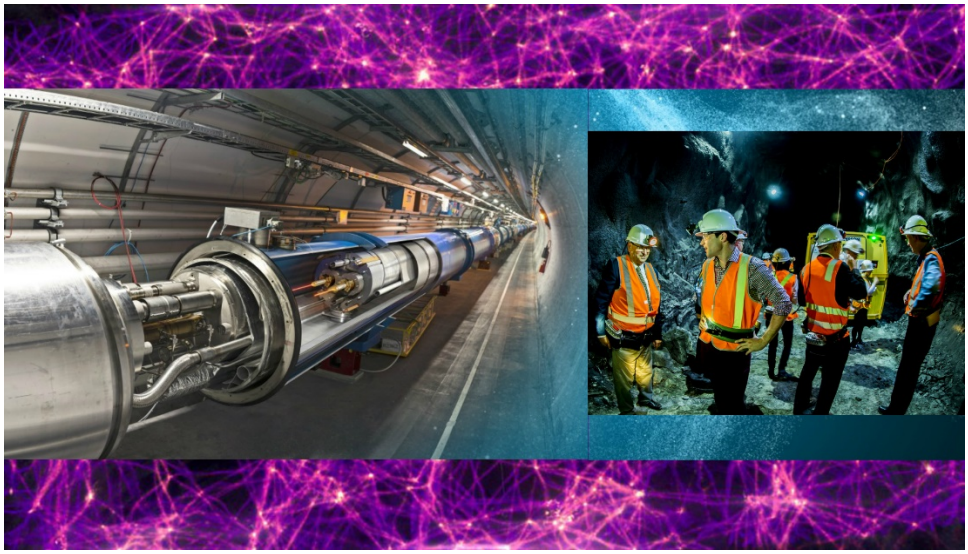
The Royal Society of Victoria Inc.
8 La Trobe Street, Melbourne
Victoria 3000
Tel. (03) 9663 5259
rsv.org.au

October Meetings & Events

DARK MATTER: A SOUTHERN HEMISPHERE PERSPECTIVE



The first October meeting of the Royal Society of Victoria will be held on
Thursday, 13th October 2016 at 7.00pm.

Speaker: **Professor Elisabetta Barberio**
Chief Investigator, ARC Centre of Excellence for Particle Physics at the Terascale
Professor of High Energy Physics, School of Physics, The University of Melbourne

Since the Dark Matter question was initially raised by Fritz Zwicky in the 1930s, evidence for a particle or a set of particles explaining the nature of dark matter remains absent. Determining the precise nature of Dark Matter is one of the main open questions of contemporary physics.

The resolution of this open question will probably entail a major Copernican revolution; “normal,” baryonic matter, which constitutes our known environment, represents only about 4% of the total energy content in the Universe. In the last decade, there has been impressive experimental progress to detect dark matter interactions with normal matter, with the development of new generation technologies used in direct detection experiments. The sensitivity of these experiments has improved tremendously, producing devices uniquely suited to solving the dark matter puzzle.

Join Elisabetta Barberio, Professor of High Energy Physics at the University of Melbourne, who will discuss the direct search for dark matter within the Southern Hemisphere with the SABRE experiment, which will either confirm or deny current results from Northern Hemisphere experiments and may well lead to a breakthrough discovery. It will also discuss the physics program of the first underground physics laboratory of the Southern Hemisphere, SUPL (Stawell Underground Physics Laboratory), right here in Victoria, Australia, which will house the SABRE program.

About the Speaker:

Professor Barberio has been a member of the Experimental Particle Physics Group at the University of Melbourne since 2004. Previously, she was a staff researcher at CERN, the European laboratory of Particle Physics.

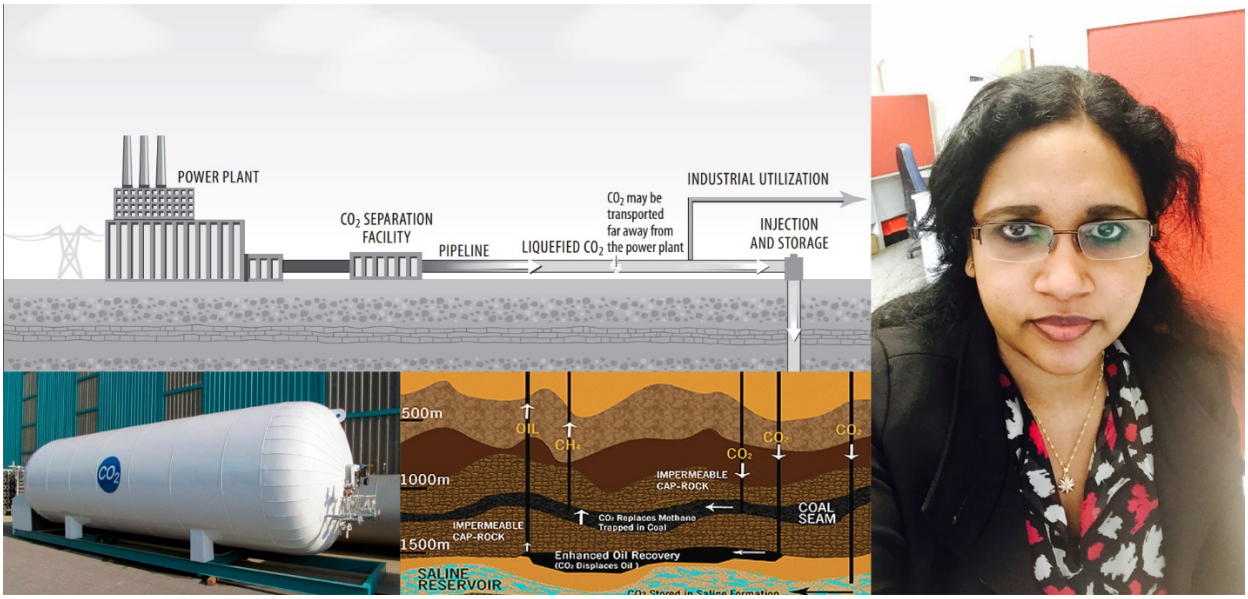
She was involved with data analysis in the OPAL experiment at Large Electron Positron Collider at CERN. Precision measurements made at this collider have confirmed the theory describing the fundamental particle behaviour to an extraordinary degree of precision.

Professor Barberio is a Chief Investigator with the ARC Centre of Excellence for Particle Physics at the Terascale and leads the SUPL project, part of an international collaboration with leading physicists based in a sister underground laboratory at Gran Sasso, Italy.

Eventbrite

Places are strictly limited, **bookings essential!** Book online now at http://ow.ly/3Vd9304DuDH call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au. If you plan to join us for food and drink ahead of the panel session from 6.15pm, please register your attendance so we can anticipate catering requirements. **All most welcome.**

CARBON SEQUESTRATION – ARE DEEP COAL SEAMS THE ANSWER?



The second October meeting of the Royal Society of Victoria will be held on
Thursday, 27th October 2016 at 7.00pm

Speaker: Dr Samintha Perera

Lecturer in Geomechanics
Department of Infrastructure Engineering, The University of Melbourne

The ever-increasing use of fossil fuels in energy generation has created a crisis in the Earth's climate systems through significantly increasing the release of carbon dioxide (CO_2) into the atmosphere, a major contributor to rapid global warming. Among many of the urgent measures being explored to mitigate the ongoing discharge of CO_2 from industrial sources is the capture and storage of this 'greenhouse gas' through a process known as carbon sequestration.

Among the various CO_2 storage options, sequestration in deep, un-minable coal seams is currently attracting worldwide attention from the scientific community. This approach has unique advantages over other options due to its appealing capacity to enhance coal seam gas production and extraction, which can potentially offset the costs of sequestration. However, the effectiveness of deep coal seams as an option for carbon storage needs to be counterbalanced with the high risks associated with this process before moving to a large scale field application.

The deep coal seams ideal for CO_2 storage are located at depths of more than one kilometre. The high pressure and temperature conditions existing at these depths cause injected CO_2 to be converted into its super-critical, highly chemically-reactive state, which in turn generates a significant swelling in the coal mass with a subsequent, significant decline in the CO_2 flow ability, meaning further injections of CO_2 will be compromised. Further, the significant strength reduction in seams absorbing an injection of CO_2 may cause the gas to instead leak out into the atmosphere, with a chance of dangerous outbursts. While a simultaneous injection of nitrogen can mitigate this latter risk, there are no indications of any process that can avoid the significant swelling of coal mass created by injections of CO_2.

About the speaker:

Dr Samintha Perera is the 2016 winner of the Royal Society of Victoria's Phillip Law Postdoctoral Prize for the Physical Sciences. Her research specialisations and interests incorporate rock mechanics, coal mining and "slop stability," CO_2 sequestration and unconventional oil and gas extractions. To date, Dr Perera has over 60 publications in highly regarded international journals and monographs and is an associate editor of *International Journals of Natural Gas Science and Engineering* and *Geomechanics and Geophysics for Geo-Energy and Geo-Resources*. She has recently been appointed as a Lecturer in Geomechanics with the Department of Infrastructure Engineering at the University of Melbourne.

Eventbrite

Places are strictly limited, **bookings essential!** Book online now at http://ow.ly/Aj11304Duqt, call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au. If you plan to join us for food and drink ahead of the panel session from 6.15pm, please register your attendance so we can anticipate catering requirements. **All most welcome.**

Partner Events
ADA LOVELACE DAY: CELEBRATING WOMEN & GIRLS IN STEM

The Inner Eastern Local Learning and Employment Network (IELLEN) is proud to be working in partnership with the Royal Society of Victoria, Capital City LLEN, DataSAM, Women in Science and Engineering, Lateral Magazine, Swinburne University and BrainSTEM to present an **Ada Lovelace Day event on the evening of Wednesday 12 October, 2016.**

The event is aimed at Secondary School age girls and their parents/guardians, and is about celebrating the achievements of Women in Science, Technology, Engineering and Maths to inspire the next generation. With a long way to go until we bridge the gap between the numbers of women participating in many STEM fields, Ada Lovelace Day (which has been running the UK and US for several years) aims to raise awareness of the champions that already exist and the pathways they've taken.

The night will feature talks from women in a range of STEM fields and at different stages of their careers, plus organisations offering insight to STEM careers, including:

- Leonie Walsh, former Lead Scientist of Victoria and entrepreneur
- Sophia Frentz: Vice-President of Women in Science and Engineering at University of Melbourne
- Foundation for Young Australians – presenting on growth industries and the rise of STEM Careers
- Sid Verma from BrainSTEM (and BrainSTEM participant) – Science Mentoring Program
- Engineers Without Borders, Swinburne Uni, Robo Gals Monash and IEEE WIE, Latrobe will be running a number of STEM activities or will have a presence on the night.

Light refreshments will be available at the event. Please advise of any dietary requirements when registering online. Please arrive at 6pm for a 6:30pm start.

For more information and free-Ebook, please contact Edward Dunstan at the IELLEN on 03 9510 5444 or at edunstan@iellen.org.au .

Who was Ada Lovelace?
Ada Lovelace is widely held to have been the first computer programmer, with her work on the Analytical Engine (in the 1840s!) one of the most important developments in the evolution of computer programs and technology. Find out more at http://findingada.com/about/who-was-ada/ .

Eventbrite

Places are strictly limited, **bookings essential!** Book online now at http://ow.ly/Xxvb304DuRi . **All most welcome.**

GROWING TALL POPPIES: 2016 SYMPOSIUM

Professional Development for Teachers of Physics, Science, and Careers (Certificate of Participation Provided). Extension and Leadership Development for Outstanding Students.

The 2016 Symposium will include the awarding of the **Junior and Teacher Tall Poppies 2016 Awards**, and professional development activities for all.

We will have:

1. Leadership Workshops for the Teacher and Junior Tall Poppies Winners and

2. Professional Development for teachers and student alumni members.

Come and explore the historic Royal Society of Victoria and gain insight to its facilities and programme as a resource for science teachers and students.

Program Outline:

8.30 am **Registration – tea & coffee Burke & Wills Room**

9.00 am Welcome to RSV – Keynote: Jacqui Savage, Bioengineer & Founder, Medcorp Technologies

9.45 am Awards Ceremony and induction for *Junior and Teacher Tall Poppies 2016*

10.30 am **Morning tea and networking**

11.50 am

Leadership Workshop: Teacher Award Winners with Greg Flattley

Leadership Workshop: Junior Award Winners with Young Scientists Australia (Melbourne)

Workshop 1 – Making Physics Easy – a Year 10 program for teachers – hands on activities

Workshop 2 – An exercise in interdisciplinary science

1.15 pm **Lunch (provided)**

Networking and Displays

2.30 pm **Close**

The Growing Tall Poppies Science Partnership Program aims to increase the number of girls studying physics beyond year 10 and broadly to engage secondary students to study more sciences in Years 11 and 12. We also coordinate the Victorian Award System to recognise and develop science teachers and students who want to champion science programs in their schools. We are honoured to present these awards at this year's symposium.

Eventbrite

Places are strictly limited, **bookings essential!** Book online now at http://ow.ly/WhlD304DuYi . **All most welcome.**

RSV Outreach Program

The Field Trip: Journeys in Science

We are delighted to congratulate our outreach partner The Field Trip on winning the "Trailblazer Award for Most Innovative Practice with Youth Engagement" at the Unleashed Festival on 24 September, presented by the Foundation for Young Australians.

Director **Paul Kooperman** has put huge energy and commitment into the Field Trip program, targeting communities from the Victorian Central Ranges, the City of Hume and central Melbourne, including the "Journeys in Science" chapter hosted here with the Royal Society of Victoria in Term 3.

We've learned much from this Term's pilot program and participants, and are currently tailoring a new offering for launch in 2017 with our intrepid partners the Field Trip, Young Scientists Australia (Melbourne) and the Growing Tall Poppies Partnership Program.

Paul Kooperman and friend at the Unleashed Festival award ceremony.

School Holiday Science: Microscope Drawing Laboratory & "Small Friends" Storytelling

Meanwhile, our friends from the Scale Free Network have been busy again, this time delivering a wonderful two-day school holiday program here at the Royal Society of Victoria.

Using a range of activities, including use of stereo microscopes generously provided on loan from the University of Melbourne's School of Biosciences (grateful thanks to **Dr Ann Bohte** for this wonderful support!), Dr Gregory Crocetti and Briony Barr took the kids on a journey through the hidden microscopic worlds around and within us, masterfully directing some very boisterous young people to follow their innate curiosity.

In the Burke and Wills Room, we had trouble keeping dirty Band-Aids on fingers during the discovery-hungry Microscope Drawing Laboratory!

A lively interactive presentation on microscopic worlds in the Ellery Theatre.

Grateful thanks to Gregory and Briony, and to our Outreach Chair Helen Gardiner, for bringing together a most unique science engagement program for these school holidays.

Nominations for RSV Membership

Nominations for membership of the Society have been received on behalf of:

Dr **Peter Alexander GROSSMAN,** Research Fellow (Mathematics)
Dr **Lotfaliany Abrand Abadi MAJTABA,** PhD Student
Mr **Alcides Antonio FLORES MENDEZ**, Stock Trader, MBA Student
Mr **Sheila NANKOBERANYI**, PhD Student
Mr **Christopher Peter AVRAM**, Retired Information Technologist
Mr **Jory Dean CLARKE**, Science Teacher

Unless Members request a ballot, they will be considered for election by Council and if elected, will be announced at the Ordinary Meeting of the Royal Society of Victoria held on 10th November.

Recently elected members who have not yet signed the Society's membership book are invited to attend the 13th October meeting to be formally welcomed as members. Please inform the office if you plan to attend.

The 2016 Phillip Law Postdoctoral Prize Winner – Dr Samintha Perera

Warmest congratulations to Dr Samintha Perera, this year's winner of the Phillip Law Postdoctoral Prize for the Physical Sciences!

Dr Perera's postdoctoral achievements have been most impressive. She was awarded her PhD in Civil Engineering from Monash University in 2012 and has since been engaged as a Post-Doctoral Research Fellow, Research Assistant and ARC DECRA Fellow with the Monash Faculty of Engineering. Her postdoctoral achievements include a Discovery Early Career Research Award from the Australian Research Council (2012), a Best Thesis Award from the Monash Civil Engineering Department (2013), the Ken Hunt Award for Best PhD Thesis from the Monash Engineering Faculty (2013), the Mollie Holman Doctoral Medal for Monash University's Best PhD Thesis (2013), the ROCHA Medal for a world's best PhD Thesis in Rock Mechanics from ISRM (2014), a Monash Civil Engineering Department Early Career Researcher Award (2015) and the Monash Engineering Women's Leadership Award (2015).

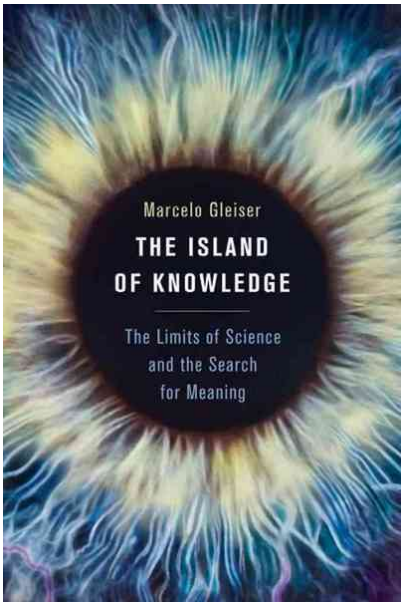
Dr Perera recently joined the University of Melbourne's Department of Infrastructure Engineering as a Lecturer in Geomechanics, and will deliver a lecture on 27 October, addressing the topic *Carbon Sequestration – are Deep Coal Seams the Answer?* Come along to celebrate Samintha's prize win, and hear about her valuable work to date.

Grateful thanks to our assessors Professor Sandra Rees, Professor Doug MacFarlane, Dr Kevin Orrman-Rossiter and Norman Kennedy for their diligent efforts this year.

The Big Ideas Book Club

Wednesday, 26 October @ 6:30PM
Embiggen Books, 197-203 Lt Lonsdale St

This month the Big Ideas Book Club explores *The Island of Knowledge: The Limits of Science and the Search for Meaning* by Marcelo Gleiser.



'To be human is to want to know, but what we are able to observe is only a tiny portion of what's "out there." In The Island of Knowledge, physicist Marcelo Gleiser traces our search for answers to the most fundamental questions of existence. In so doing, he reaches a provocative conclusion: science, the main tool we use to find answers, is fundamentally limited.'

'These limits to our knowledge arise both from our tools of exploration and from the nature of physical reality: the speed of light, the uncertainty principle, the impossibility of seeing beyond the cosmic horizon, the incompleteness theorem, and our own limitations as an intelligent species. Recognizing limits in this way, Gleiser argues, is not a deterrent to progress or a surrendering to religion. Rather, it frees us to question the meaning and nature of the universe while affirming the central role of life and ourselves in it. Science can and must go on, but recognizing its limits reveals its true mission: to know the universe is to know ourselves.'

'Telling the dramatic story of our quest for understanding, *The Island of Knowledge* offers a highly original exploration of the ideas of some of the greatest thinkers in history, from Plato to Einstein, and how they affect us today. An authoritative, broad-ranging intellectual history of our search for knowledge and meaning, The Island of Knowledge is a unique view of what it means to be human in a universe filled with mystery.'

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Participation in the Big Ideas Book Club is free – just get yourself a copy, read it, and come along! RSVP at http://www.meetup.com/en-AU/Big-Ideas-Book-Club/events/233817726/

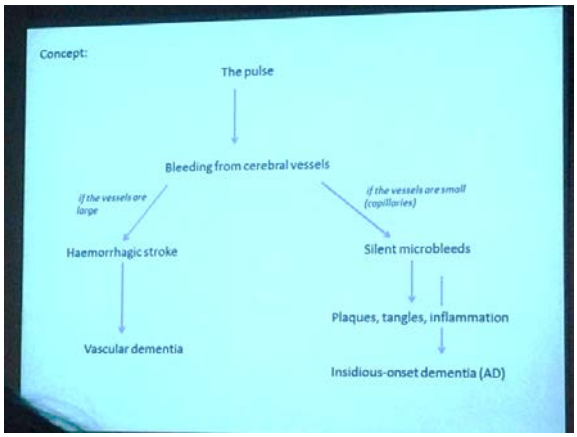
Alzheimer's Disease: is the Brain Destroyed by the Pulse?

Dr Bill Birch with Professor Jonathan Stone

Thought provoking material indeed from the University of Sydney's Professor Jonathan Stone, who made a most compelling case on the evening of Thursday, 8 September for the causative role of cardiovascular disease in the deterioration of two of the body's most vascular organs: the kidneys, and the brain.

Professor Stone illustrated the mechanical contribution of stiffening major arteries to extensive, "silent micro bleeds" in a brain under increased blood pressure, leading to a steady and tragic deterioration.

For Professor Stone, there has been too much focus on the treatment of "plaques and tangles," and on neuroplasticity, without due focus on the major role of vascular pathology in this debilitating illness. An insightful and often moving presentation of great value, particularly for those in attendance with loved ones suffering from dementia or Alzheimer's Disease.



Keeping Melbourne Marvellous: People, Place & Environment

On Thursday, 22 September, the City of Melbourne's Chief Resilience Officer Toby Kent convened a panel that included Michel Masson (CEO, Infrastructure Victoria), Jerril Rechter (CEO, VicHealth) Dylan Brady (Conductor, Decibel Architecture) and Rachel Carey (Research Fellow, Food Policy Research Group) for a marathon forum on Melbourne's future resilience, canvassing everything from our foodbowl to our roads, rivers, trains, regional development, gender equity, alcohol and tobacco control, homelessness and the immense challenges of population growth and climate change. What a whirlwind - so much to cover, and so little time to bring it all together. Plainly fertile ground for a symposium!

Toby Kent, Bill Birch, Michel Masson, Jerril Rechter, Dylan Brady, Rachel Carey.

We aim to post some video footage from the evening soon for those who missed out. Meanwhile, much gratitude to our hard-working Science Program Chair, Professor Sandra Rees, and our star-studded panel of community leaders and big thinkers for a really wonderful night, talking about the enduring 'liveability' of the city we know, love and call home.