STAV & AIP

VCE Physics Teachers’ Conference 2005

Wednesday 9 February 2005 @ Monash University, Wellington Road, Clayton

Each participant will receive a CD of Proceedings from all STAV VCE Conferences Series 2005 as part of their registration.

The Program includes:

- Keynote address by Dr Dick Gunstone on ‘Rethinking physics content - how we teach impacts on what we teach’
- The Physics Oration by Dr Robyn Arianrhod, Monash University
  ‘Discovering physical reality through the language of mathematics’ (see description below)
  Dr Arianrhod is the author of the popular book *Einstein’s Heroes*
- Bruce Walsh’s Examiner’s Report on the June and November Pilot Exams
- 27 workshops.

### Conference Program

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<th>Event</th>
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<tr>
<td>8.00am</td>
<td>Registration opens (Foyer, South One Lecture Theatre, Building 64)</td>
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<tr>
<td>8.50am</td>
<td>Conference opening (South One Lecture Theatre, Building 64)</td>
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<td>9.00am</td>
<td>Keynote Address (South One Lecture Theatre, Building 64)</td>
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<td><strong>10.00am</strong></td>
<td><strong>Examiner’s Report on the Pilot Exams from June and November 2004</strong> (South One Lecture Theatre, Building 64)</td>
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<tr>
<td>11.00am</td>
<td>Morning Tea / Displays (Main Dining Room - 1st Floor, Building 10)</td>
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<tr>
<td><strong>11:45am</strong></td>
<td><strong>Workshops Session A</strong></td>
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<td>12.45pm</td>
<td>Lunch/Displays (Main Dining Room - 1st Floor, Building 10)</td>
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<td><strong>1.45pm</strong></td>
<td><strong>Workshops Session B</strong></td>
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<tr>
<td><strong>2.50pm</strong></td>
<td><strong>Physics Oration</strong> (South One Lecture Theatre, Building 64)</td>
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<td><strong>Dr Robyn Arianrhod, Monash University</strong></td>
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<td>I plan to talk about the role of maths as the language of theoretical physics, in particular, its uncannily prescient role in many physical discoveries, such as radio, mass/energy, the expanding universe, positrons, quantum mechanics etc. I’ll put this in context by briefly discussing the way theory and experiment are interlinked - the paradigm of modern theoretical physics (and its revolutionary beginning with Maxwell’s prediction of radio) - and how theories are built upon each other in what is ultimately a collaborative process.</td>
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<td>3.50pm</td>
<td>Wine and Cheese (South One, Foyer)</td>
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<tr>
<td>4.45pm</td>
<td>Guided tour of the Synchrotron construction site (limited numbers, TBA)</td>
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Descriptions of Workshop Sessions
(Commercial: Comm, New Teachers: N, Units 1 & 2: 1&2, Units 3 & 4: 3&4, General: G)

Session A - 11.45am

A1 Course Planning for Unit 3 (3&4)
Three Teachers from the Pilot Schools
They will each talk about how they sequenced the Areas of Study, the amount of class time they gave to each Area of Study, the course documents they gave to their students, useful prac activities, and possible assessment tasks.
No Limit

A2 POEs, Post Boxes and Interview about Instances/Events (G)
Peter Hubber, Deakin University
This session discusses a variety of teaching and learning strategies that are designed to elicit the personal views of students with a view to enhancing their learning. These strategies include Predict Observe Explain (POE) strategy, Post Box strategy and Interview about Instances/Events strategy. Different examples for each strategy will be provided but it is hoped that participants to this session will provide more.
Limit: 30

A3 Teaching Plans and Practical Activities for ‘Synchrotron and its applications’ (3&4)
Helen Lye, ACER and Dan O’Keeffe, AIP
This session will be about the material prepared by the AIP Education Committee’s DIIRD funded “Synchrotron Project” It includes teaching plans linking this Detailed Study to the core Areas of Study, simple practical activities as well as an experiment on Bragg diffraction with microwaves and demonstration of using Excel to generate diffraction graphs for student analysis. Most of the session will be devoted to hands-on experience.
Limit: 40

A4 Cathode Ray Oscilloscope (3&4)
Jim Royston, La Trobe University
The VCE lab exercise starts with a demonstration of DC and AC waveforms, which introduces the major oscilloscope controls. An optional video explains further what these controls do and also how the CRO works internally. Once reasonable mastery of CRO functions and controls is attained, the students can progress to a practical example of a class of waveforms which can be best understood with a visualization of the signal – rectified waveforms. This stage of the experiment gives an opportunity for students to investigate the effect of more than one diode and the presence of capacitors to store and release energy.
Limit: 20

A5 Teaching Einstein’s Relativity in VCE Physics (3&4)
Keith Burrows, Rudolf Steiner School
The Einstein’s Relativity DS will provide a wonderful opportunity for students to experience one of the real joys of physics – a feel for the way in which physics helps us to understand the fundamental nature of our universe. The purpose of this session is to help those teaches wondering whether to offer this DS. The content will be described, along with suggestions for related activities, useful websites and lessons learned from pilot schools in 2004.
No Limit

A6 Probing the Unseen Universe – Radio Astronomy in Australia (1&2)
Robert Hollow, Education Officer, Australian Telescope National Facility
Australia was a pioneer and is still a world leader in the field of radio astronomy. This workshop presents the physics behind the production of radio waves in space, a brief history of Australian radio astronomy, the role of CSIRO’s Australia Telescope National Facility and the astronomical research done using its instruments. Recent discoveries and technological developments are discussed and placed in context, Australia’s involvement in planning and building future radio telescopes such as the international Square Kilometre Array (SKA) will be discussed.
No Limit

A7 Energy and Forces and Rockets (the theory and activity) (G)
Peter Razos and Greg Hunter, Trinity College
Introducing physics to junior classes can be an overwhelming and sometimes boring experience for young minds. The experience can be full of excitement and genuine interest. We will explore the physics behind a rocket launch. Participants will use an online resource specifically written to assist teachers covering concepts of energy and forces. As well, participants will be encouraged to build and launch their own rockets.
Limit: 30

A8 From Black Currant to Green Current! An Exploration of Photovoltaics (Comm)
Frank Bosgraaf, Intex Solutions Pty Ltd
Every day we see fascinating solar cells at work. These cells include spinach, algae and leaves of trees all of which convert sunlight by means of photosynthesis into energy containing nutrients such as sugar, which are important for life. Why could we not use spinach and a little sunlight to generate electricity? Is it possible to generate ‘green current’ out of black currant? We will explore the answer to these questions and introduce a new generation solar cell which generates electricity using nanotechnology and artificial photosynthesis.
No Limit

A9 Using Tainlab in Physics (Comm)
Stephen Howard, TAIN Electronics
The Tainlab system offers a variety of valuable experimental opportunities in mechanics and electronics. A selection of these, relevant to the present course will be demonstrated.
Limit: 20

A10 The Helicopter: A context for Unit 2 Aerospace and Units 2 & 3 Motion (1&2)
Kelvin Barraclough, Gisborne SC
The session will describe how the helicopter functions and where Newton’s laws come into play in its flight and focuses on what has happened to some pilots who have tried to operate outside Newton’s limits.
The information has relevance to the Detailed Study of Aerospace in Unit 2 as well as appreciation of Newton’s Laws at work in the Unit 3 motion Area of Study. In Aerospace it is a wonderful example of the first dot point about balancing forces, moments, and the equilibrium needed in stabilising the helicopter.

No Limit

A11 Analysing Luna Park Data (Comm)
Ed Menegol, Connetcoting point
This session will demonstrate how the data from the x-, y- and z- accelerometer and the altimeter worn by the students on the rides can be analysed in the classroom.
Limit: 30

A12 Photonics for Schools (units 3 & 4)
John Sturm, Sacred Heart College, Geelong
This session introduces a photonics kit developed in association with Andrew Papworth of ANU. Participants will work through 7 stations with supporting practical notes. Also relevant to Unit Electronics and photonics.
Limit: 20

A13 Physics - Hands on! (Comm)
Doug Bail, Cider House ICT
Your chance to play, learn, test the latest physics equipment relevant to the new VCE course; photonics, aerospace, sound, motion and more. Experienced users will be on hand to help you explore the possibilities.
Limit: 20

A14 Free software for the new Physics course (1&2, 3&4)
Rob Braidwood & Ben Cantwell, Balwyn High School
This session will demonstrate software recently developed by Rob that can be used to teach the major concepts of the new Physics course. Areas covered include: Motion, Relativity, Electronics, Electricity, Units 3 &4 Light and Photonics.
Limit: 20

Session B - 1.45pm

B1 Beginning Teachers Units 3 & 4 (N)
Colin Hopkins, Trafalgar High School & Corey Walker, Balwyn High School
BHS has been given a federal government grant to support isolated rural schools by offering a program which includes a CD ROM of notes, applications, examples and worked solutions. The session is an introduction for those already in the project, plus an information session for those who are interested in joining. The majority of the session focuses on the scheduling of Unit 3 Physics at BHS, working through the CD ROM, with some time on Unit 1 and on a Q and A session. The CDROM, which is supplied as part of the project, will also be available for purchase from BHS for use as a basis for other teachers to develop their own.
Limit: 20

B2 Course Planning for Unit 4 (3&4)
Three Teachers from the Pilot Schools
They will each talk about how they sequenced the Areas of Study, the amount of class time they gave to each Area of Study, the course documents they gave to their students, useful prac activities, and possible assessment tasks.
No Limit

B3 The 50th Anniversary of Atomic Absorption Spectroscopy (G)
Dr Kieran Lim, Deakin University and Jeanne Lee, Loyola College
2005 is the 50th anniversary of Sir Alan Walsh’s first atomic absorption spectroscopy (AAS) paper. AAS was developed in Melbourne and is now used worldwide for the analysis and quantification of various metals. This presentation will review the major features and uses of AAS. AAS will be linked to the VCE Physics Study Design, Unit 1 Light, and Unit 3 Light and Matter
No Limit

B4 Physics on the Net and Physics through Rockets (G)
Peter Razos and Greg Hunter, Trinity Grammar School
Participants will be introduced to an excellent online resource for the teaching of junior physics. This resource contains many worksheets, ideas and demonstrations. Participants will have access to this site to develop their own self-assessed multiple choice tests. Check it out at www.dynamicscience.com.au/tester and follow the prompts to enter ‘curriculum material’. We will also cover the use of model rocketry as a motivating resource in the teaching of physics in the junior years.
Limit: 25

B5 Power Supply Design Practical Work: Unit 3 ‘Further Electronics’ (Comm)
Peter O’Donoghue and Anthony Cincenti, Swinburne University of Technology
This session will discuss the use of hands-on construction and measurement as a primary method of delivery of ‘Further Electronics’. The session will look at doing measurements on a power supply circuit and comparing the measured values with expected results to reinforce theoretic work with real world results. The use of the power supply kit developed by Swinburne University of Technology and the Physics Dept at MLC will be highlighted. The kit has been specifically designed for this Detailed Study.
Limit: 30

B6 Relativity makes sense (3&4)
Ross Phillips, PLC
At last we have the opportunity to teach relativity. This is exciting but also daunting. This session will provide a possible teaching program, some ideas for activities and an introduction to teaching the topic.
No Limit

Lunch/Displays
12.45pm
(Main Dining Room)
B7 Using Computer Technology for Physics Teaching (Comm)
Phil Jones, The Logical Interface
In this workshop I examine a number of technologies that I have used with my students including: Video analysis using Web cams and video analysis software. Web cams provide an inexpensive alternative to digital and traditional video cameras for capturing motion. New developments in data loggers which make data logging easier and more accessible including using Pocket PCs to make data logging simple and practical. Other possible areas of interest include: Tutorial and Game based software, Simulation software and Interaction physics.
Limit: 20

B8 Ideas for Effectively Teaching VCE Astronomy and Astrophysics (1&2)
Robert Hollow, Education Officer, Australian Telescope National Facility
Astronomy and Astrophysics are often perceived as difficult topics to teach in the classroom due to a lack of ‘practical’ work. This workshop presents some simple ideas for effectively conveying key concepts to students. It also shows how freely available visualisation tools can be used in the classroom to engage, challenge and extend students.
No Limit

B9 Quantum Demystified and where it fits the new course (G)
Martin Mahy, De La Salle College
Most people have heard of a ‘quantum leap’. Very few understand it. As the most successful physics theory of the 20th century, students deserve a good introduction to quantum. Improve your understanding and learn strategies and hands-on activities for the classroom.
Limit: 40

B10 Using discussion to improve students’ understanding of electric circuits (G)
Pam Mulhall & Brian McKittrick, Education Faculty, Monash University
Are you looking for ways of improving your students’ understanding of electric circuits that go beyond just doing practical work and solving problems? Many practising teachers have found CUPs (Conceptual Understanding Procedures) useful for promoting students’ active engagement with physics concepts, including those in electricity. During the session a CUP will be demonstrated, with participants playing the role of students. The task will be to think about and discuss a qualitative problem about an electric circuit, and try to reach consensus about the answer. Both students and teachers find CUPs an enjoyable and fruitful way of helping learning and teaching.
Limit: 24

B11 Analysing Luna Park Data (Comm)
Doug Bail, Ciderhouse ICT
Luna Park is now open for Physics. Find out how others have already experienced Luna Park with their classes. See how you can get involved with your class. The session will demonstrate how the data from the x-, y- and z- accelerometers and the altimeter worn by the students on the rides can be analysed in the classroom.
Limit: 30

B12 Bend it like Beckham: Simulating particle motion in a Synchrotron (3&4)
Ranjith Dediwalage, St Leonard’s College
The time available to teach Unit 4 is 11 – 12 weeks. This is not enough to provide a full practical approach. Is there a way to overcome this difficulty? In this session I will share some ideas on how you could teach the Detailed Study Synchrotron and its applications together with the other two learning areas. You will get a chance to see the use of some available resources and a few practical activities. Some assessment ideas will also be discussed.
No Limit

B13 Alternative Energy Sources and CERES (Comm)
Judy Glick, CERES
A presentation of an excursion to support teaching the Unit 2 Detailed Study Alternative energy sources. The excursion makes use of the wide range of renewable alternative energy resources at CERES and enables students to assess these considering economic, social, moral political and environmental factors.
No Limit

Physics Oration
2.50pm
(South One Lecture Theatre)

Wine and Cheese
3.50pm
(Foyer, South One Lecture Theatre)
A chance to network with presenters and other Physics teachers