

2010 STAV/AIP Physics Teachers' Conference



Friday 5 and Saturday 6 February 2010

Monash University, Wellington Road, Clayton, Victoria

Each participant will receive a CD of Proceedings from the VCE Conference Series 2010 as part of their registration. (Excluding VCE Psychology)

The Program includes:

- Day and Evening sessions. Participants can attend the day and/or evening sessions,
- Opening address on 'Physics in the National Curriculum' by the science manager of ACARA, the Australian Curriculum, Assessment and Reporting Authority,
- The Physics Oration by Dr Andrew Melatos of University of Melbourne on 'The Bullet Cluster and the evidence for Dark Matter',
- Report by Bruce Walsh, the Chief Assessor, on the June and November Exams, during the day program and again in the evening program,
- 50 workshops over five sessions with many related to ICT, Teaching strategies, Practical activities and Content,
- A Saturday program of excursions with first preference given to interstate participants,
- Accommodation is available at Mannix College, adjacent to Monash University. Check www.vicphysics.org/forthcomingevents.html for details.

Laptops at the Conference

In the past some participants have brought their laptops. To store laptops during the day, laptop lockers with power are available in the lobby of the S9 - S12 lecture theatres at no cost.

Lockers need to be booked on the Application Form. Keys can be picked up at Registration.

Science Teachers' Association of Victoria Inc.

Postal Address: PO Box 109 Coburg VIC 3058

Phone: (03) 9385 3999 • Fax: (03) 9386 6722

Email: stav@stav.vic.edu.au

Website: www.sciencevictoria.com.au

Conference Program

Friday Day Program

8:00 Day Registration

8:50 Conference Opening

9:00 Opening Address

10:05 **Workshops: Session A**

11:05 Morning Tea/ Displays

11:50 **Workshops: Session B**

12:50 Lunch / Displays

1:50 **Physics Oration**

2:50 **Workshops: Session C**

4:00 Tea/Coffee

Friday Evening Program

4:30 Evening Registration

5:30 **Workshops: Session D**

6:30 **Workshops: Session E**

7:30 Finish

Saturday Excursion Program

Tour A: Bus (Limit: 24)

9:15 Australian Synchrotron

11:00 Brash's Soundhouse

12:30 Lunch at a Southgate restaurant

2:00 Victorian Space Science Education Centre

3:30 Travel to Airport.

Tour B: Train, then Bus (Limit: 20)

10:15 Medical Physics In-Service at Peter Mac

12:30 Lunch at a Southgate restaurant

2:00 Victorian Space Science Education Centre

3:30 Travel to Airport.

STAV/AIP VCE Physics Teachers' Conference 2010

Opening Address
8:50am – 10:00am

Day Program

(Commercial: C, Units 1 & 2: 1&2, Units 3 & 4: 3&4, General: G)

Session A

10:05am – 11:05am

A1 Australian Synchrotron Excursion: What it offers (3&4) Repeated in D5 Jonathan de Booy, The Australian Synchrotron

Schools can now book a half day excursion to the Australian Synchrotron that includes a tour of the facility and an opportunity to do a range of practical activities for the Synchrotron Detailed Study as well as the 'Light and Matter' Area of Study. The activities use equipment that is not available to schools. The session will describe what the students will see and do. The Synchrotron also plans to develop practical activities for middle school level.

A2 Youtube Physics: Using online movie resources (G) Repeated in E5 Christopher Jones, University High School

There is a large amount of online video resources suitable for VCE Physics. Incorporating video into your lessons is a great way to engage your students. During this session I will show you some of my favourite YouTube clips as well as look at a number of physics web sites that have video demonstrations. We will also look at some video software tools that allow you to play different format videos as well as converting video clips to different formats.

A3 The Physics of Model Rocketry (1&2)

Peter Razos, Trinity College

Energy conversion, forces, chemical reactions. Can you teach these topics with excitement and involvement of the entire class? You can do it through model rocketry. Participants will be encouraged to build and launch their own model rocket. We will also discuss strategies for the use of this resource in the science, chemistry and physics classrooms. You can visit the online resources prior to the

conference on www.dynamicscience.com.au/tester enter as a guest and go to curriculum material (flight). All participants will come away with resources and strategies that can have immediate impact on their classroom teaching.

A4 Investigating structures & photonics with PASCO (C)

Doug Bail, Ciderhouse

Bridging the gap between toothpick constructions and computer simulation the new PASCO structures system allows students and teachers to investigate stress and strain within simple or quite complex structures such as trusses, bridges and cranes. The Wave Division Multiplexing Kit creates considerable scope for students to analyse and understand the concepts behind communications via fibre optics.

A5 Glowing graveyards- radioactivity, nuclear decay and nature (1&2).

Repeated in B5

David Hoxley and Bob Aikenhead, La Trobe University

In this hands-on session, participants will measure the radioactivity of a number of sources, and learn how to distinguish between background, alpha, beta and gamma radiation. Opportunities for school groups to do their VCE SACs through La Trobe Physics will be discussed. Not appropriate for the pregnant.

A6 Renewable Energy and Ecologically Sustainable Design at Ecolinc (1&2)

Suzanne Clark & Claire Russell, Ecolinc, Bacchus Marsh College

Ecolinc is a DEECD Environmental Science Centre of Excellence (www.ecolinc.vic.edu.au) awarded the 2005 RAIA National Sustainable Architecture prize. In this session, take a virtual tour of Ecolinc's sustainability trail, highlighting the award-winning ecologically sustainable design (ESD) features of the building. Explore current and past data available through the online Building Maintenance System (BMS) including electricity generation, energy, gas and water usage, and the CSIRO designed Weatherwall. For Unit 2 Physics AoS 3, use Ecolinc's award winning ESD design features, BMS data and energy source equipment to initiate or conclude an investigation into alternate energy.

A7 Materials and their uses in Structures with CSIRO (3&4)

Sean Elliott, CSIROSEC

The activities in this workshop illustrate the central ideas of the Unit 3 Detailed Study 'Materials and their uses in Structures'. The equipment used offers participants a depth of analysis unavailable in most school labs. The specific activities include axial testing to obtain accurate load-extension data, observing the elastic and plastic behaviour of different materials, testing structures to identify and measure forces, and examining the effect of temperature on the toughness of materials. All equipment, including some data logging activities, is provided.

A8 Victorian Young Physicists' Tournament (VYPT): Challenge for students (1&2)

Russell Downie, AIP Education Committee and PLC

The AIP (Vic Branch) Education Committee is establishing a competition for Year 11 physics students to start in 2010.

In the course of the year, in teams of three, students will carry out a range of experimental investigations drawn from a common set, then later in the year in December, present and defend their findings in scientific discussions with other teams. Teams, if they choose, can continue on and compete in the Australian YPT held in March in Brisbane the following year. From this event an Australian team is chosen to compete internationally. This session will outline the year's program and the support that will be available to teachers and students. The value of this exercise is that it is team based, focuses on experimental investigations and encourages communication skills.

A9 Physics in the National Curriculum (G)

ACARA representative

This workshop will provide background information on the National Curriculum and the process of curriculum development. More details will be available later in the year.

A10 Send the Students Skywards (1&2)

Paul Fielding (Billanook College), Paul Fitzgerald (Ivanhoe Girls' Grammar School)

Send your students up in a plane to let them feel "two G" and "zero G". Send them up in a glider to experience the dramatic effect of a thermal up draught. During this session we will show what we do on our week long Physics Camp. We will share how we organise our camp, now in its 18th year. Our students enjoy a week of practical activities and theory while learning about physics in an exciting context.

A11 Teaching Einstein's Relativity in VCE Physics (3&4)

Keith Burrows, AIP Education Committee

The Einstein's Relativity DS provides 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. It is not a difficult topic and teachers and students who have done it invariably enjoy it. The session will outline an approach to this DS using a power point presentation which is available on the AIP website.

A12 Data collection: Taking up physics at VCE and VELS grade 3 (C)

Gary Bass CP Software

The scope and sequence of physics allows for positioning across all levels leading to advanced data collection at years 11 and 12. Data collection technologies are readily available, and simpler than ever to use to good effect. This session will explore the placing of physics data collection activities across several levels, using Vernier technologies. A further option of integrated studies with Maths/PE and History (Galileo&Newton) will be provided. Advanced activities using mobile GPS linked to google maps (in not quite real time-takes about a minute!) will be demonstrated. BYO notebook (including netbooks) sample files provided, support NING is online.

A13 Model Solar Car Challenge Provides Context for Deep Learning (G)

Ian Gardner, Victorian Model Solar Vehicle Committee

It is asserted that girls learn better if learning takes place in real contexts and boys are motivated by competition. Both of these contexts are met by participating in the Model Solar Car Challenge. The MSCC requires students to understand and apply concepts of motion, energy, electrical circuits, power generation and energy efficiency, all within a context of applying renewable energy to future transport options. This presentation will outline the benefits of participation and the relevance to the Principles of Learning and Teaching. Participants will gain hands on experience in building and testing aspects of a car.

A14 Electricity and Electric Power (C)

Bronwyn Quint, Scienceworks
This session will offer VCE Physics teachers an insight into the VCE program covering topics in the Unit 1 Electricity area of study and the Unit 4 Electric Power area of study. Electrical Safety and the effect of current on humans will be discussed as well as the devices used to protect both humans and circuits. The generation, transmission and distribution of power will also be discussed. There will also be a look at the presentations that are available in the Lightning room at Scienceworks and how they can enhance the VCE program.

Morning Tea / Displays
11.05am

Session B

11:50am – 12:50am

B1 Using Authentic Astronomical Data in Investigations & Activities (1&2)

Robert Hollow, ATNF

Astronomy is undergoing a revolution in the size and availability of real data, much of it freely and publicly available via the web. Rather than use simplified or fake data and examples, students can now access the same data as used by professional astronomers and use it to make their own discoveries. This workshop presents several schemes bringing real data to students including SkyServer, GalaxyZoo and PULSE@Parkes. Examples

of how to incorporate this into a range of classroom activities, ranging from traditional printed handouts to online and interactive use are presented. Possibilities for both guided and open-ended investigations will be discussed.

B2 Advancements in Radiotherapy (1&2)

Natalie Clements, Medical Physicist and Prof Tomas Kron, Peter MacCallum Cancer Centre

There is a continuous improvement in the field of radiotherapy. One of the problems currently being addressed is that of organs, such as the lungs, that move during exposure. With a variety of image-guided-radiotherapy techniques, as well as methods to image the patient and their moving tissues, the accuracy of cancer therapy using radiation has improved dramatically. Prof Kron is the President of the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM).

B3 Tips and Hints for Beginning Physics Teachers (N)

Colin Hopkins, Trafalgar High School

These are a series of must do demonstrations, that we have found really keep the interest levels very high with students of all ages. Most are Year 11/12 Physics, but some can easily be modified and used in junior science. A resource CD will also be provided. Suitable for inexperienced teachers and teachers new to Physics.

B4 Online Physics (G)

Peter Razos, Trinity Grammar School

Animations, video, demonstrations, teaching ideas, self assessed multiple choice testing and lesson plans. All for free and online. Participants will be given access to this online resource and will be shown how to create their own online tests and use the vast array of resources on the site. Check out the site prior to the conference at www.dynamicscience.com.au/tester enter as a guest and go to curriculum material.

B5 Glowing graveyards- radioactivity, nuclear decay and nature (1&2).

Repeat of A5

David Hoxley and Bob Aikenhead, La Trobe University

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B6 Enrichment Activities for Middle School Physics (G) Repeated in C11

Lynne Kelly, science author

VCE physics students often complain of boredom in primary and junior secondary science. Unfortunately, many are put off physics. It is very difficult for teachers to enrich the science curriculum in the demanding environment of a mixed-ability classroom. This presentation will focus on the EUMY (Enrichment Units for the Middle Years) curriculum materials, which enable easily implemented and flexible delivery of enrichment material, adjustable to the particular school setting. The bias of the author, an ex-physics teacher, ensures there is a great deal of physics in the science, cross-curricular and even the humanities units!

B7 Hands on Photonics for VCE Physics (3&4)

Sean Elliott, CSIROSEC

CSIRO offer an exciting hands-on program examining the physics of this rapidly growing and exciting field of communications. With experiments ranging from a simple exploration of Total Internal Reflection to advanced concepts in telecommunications, students will be able to learn how new advances are enabling us all to keep in touch faster and more efficiently.

B8 The third law: Minor subplot or central to the action in Newton's script? (G) Repeated in E4

Dr Christina Hart, AIP Education Committee

In many presentations, Newton's 3rd law appears as an afterthought, as though the first two laws are what really matter and the 3rd law is only relevant to situations involving collisions or explosions. In reality, the 3rd law defines what counts as a force in the Newtonian model, and introducing it alongside the 1st and 2nd laws can help to address some common difficulties that arise when students and teachers first encounter Newton's laws. This workshop will consider how to incorporate the definition of force implied by the 3rd law into teaching about force and motion at year 11 and in earlier years. This will highlight the reason behind one small but significant change in unit 2 of the new study design for VCE Physics.

B9 The Advantages of doing "Synchrotron and its applications" Detailed Study (3&4)

Kim Northmore, Simonds Catholic College

This session will outline the significant advantages to both students and teachers of this Detailed Study. An extensive list of resources will be supplied as well as SACs and teaching notes. A range of practical activities will also be explored.

B10 The virtual lab - using learning objects in VCE Physics (G) Repeated in D4

Justin Vincent, Melbourne High School

In recent years, the number & quality of online learning objects as grown enormously. Physics is especially well suited to the use of such resources.

This session will show how online simulations are used to improve students understanding at all year levels and as the basis of VCE assessment tasks. Participants will receive a copy of the resources from flashscience.com.

B11 Video analysis of motion (1&2) Repeated in E2

Gary Bass CP Software

Improved understanding can be gained by the use of visual reinforcement to basic physics concepts. The use of video analysis requires little additional preparation other than a preparedness to accept fuzzy data. No longer will it be possible to get perfectly smooth 'textbook' graphs. Real graphs demand real understanding.

B12 An Online Social Network for VCE Physics (G)

Adrian Camm, McGuire College

Increasing connectedness through the use of the internet and web2.0 tools has redefined the concept of community as a defined geographic area. We are seeing increased uses of social networking tools and online spaces for truly immersive forms of learning and for a level of collaboration that is erasing traditional confines and borders. During this session you will hear about how a VCE Physics Unit 3&4 Virtual Learning Community links all students across Victoria to experienced educators, fellow students and textbook authors. Come and learn how the initiative can create opportunities for students to interact with each other, educators and knowledgeable adults in authentic learning experiences.

B13 Teaching the detailed study: Further Electronics, (3&4)

Murray Anderson, Camberwell Grammar School and Jill Crawford MLC

A teaching program for Further Electronics along with prac notes and equipment lists is presented as well as discussion of the key concepts and skills to be attained by students. Both hardware and software circuit construction is discussed and an appropriate balance is of the two is outlined.

B14 Australian Space Design Competition (G)

Naomi Mathers, Victorian Space Science Education Centre

In 2009 Victorian students were part of the team that won the International Space Settlement Design Competition (ISSDC) at NASA Houston. Teams were required to design a significant infrastructure development in space considering a range of issues including structural engineering, human factors, communications, food production, energy requirements and transportation. This session will give an overview of the Australian Space Design Competition (ASDC), the qualifying competition for the ISSDC, and present feedback from the Victorian students that were part of the team that won the 2009 ISSDC.

B15 Australian Synchrotron Tour (3&4)

A one hour tour of the Australian Synchrotron located in Blackburn Rd. Transport will not be provided. Participants will be given an opportunity to arrange a ride and should leave the University grounds about 10 minutes before scheduled start.

**Lunch/Displays
12.50pm**

**Physics Oration
1:50pm - 2:50pm**

**Dr Andrew Melatos
University of Melbourne
"The Bullet Cluster and evidence for
Dark matter"**

Session C

2:50pm – 4:00pm

C1 Chief Assessor's Report on how students' performed on the Unit 3 & 4 Exams in 2009 (3&4) Repeated in D1

Bruce Walsh, Xavier College

The purpose of this session is to assist teachers in preparing their students for the Unit 3 and Unit 4 Physics exams. The Chief Assessor will report on the performance of Year 12 students in 2009. Comments on the quality of specific questions, positive or negative, should be directed to VCAA.

C2 Blogging about Physics (G)

Christopher Jones, University High School

Web 2.0 technologies, such as blogs, give students a great way to express their opinion as well as their understanding. In this session I will show how I have used blogging about issues such as Nuclear Power to engage my students in collaborative learning. I will provide participants with instructions on how to use suitable websites such as edublogs and provide worksheets and guidelines for you to modify for your class.

C3 Teacher Action on Climate Change Repeated in E3

Keith Burrows - Australian Institute of Physics (Vic Branch) Education Committee

Scientists are increasingly frustrated with the problem of communicating the seriousness of climate change to the public and politicians. Science teachers have the knowledge base to understand climate change and the skills to communicate it. The AIP Education Committee are developing a package of materials for interested teachers to use with the other teachers in their own school, their parent body and similar groups in their local community. The package is supported by an in-service for interested teachers. In this session we will explain the program and the materials.

C4 Make it real! Technology in the Physics classroom (C)

Phil Jones, The Logical Interface

In this workshop I examine a number of technologies for teaching senior physics, including Video analysis and TLI Motion video analysis software - ideal for analysing motion in one and two dimensions to produce position vs time graphs etc. Interactive Physics: a superb tool for creating simulations in physics - from Kepler's Laws through to Electromagnetic simulations. Converting your PC into a powerful Signal Generator and

Oscilloscope with TLI WaveLab. Using data loggers effectively including basic and more advanced experiments such as force on current carrying wire, electromagnetic induction, apparent mass and electronic ticker timer. Simulation software - Krucible is revolutionary software for creating simulations and demonstrating experiments that are impractical in the secondary science lab and incorporating Interactive Whiteboards into science teaching.

C5 The Challenge of Quantum Reality or how to teach what we don't understand!" (3&4) Repeated in D3

Barry Homewood, Braemar College

A hands-on workshop that will explore the interpretation of, and possible approaches to, the teaching of that most mysterious experiment in Quantum Mechanics: the Double Slit Experiment. Participants will receive a complete teaching resource (incl. DVD) from Canada's prestigious Perimeter Institute (PI) for Theoretical Physics. In addition, participants will be introduced to some of the other resources made available by the outreach team at PI. Note: Barry was the 2009 recipient of the AIP Travelling Scholarship and attended the 'EinsteinPlus' Workshop at PI last August.

C6 Motion studies using a hand held GPS (G)

Andrew McLean and Kelvin Barraclough, Gisborne Secondary College

How well does your car or student bike accelerate? Is its acceleration greater than an aircraft? Could it beat a tram or a train or ship in a race? Is the centripetal acceleration constant during a loop in an aircraft? Is the loop round? When you next study motion with graphs or data in Unit 2 or 3 physics, do it with real data from real situations. This is an exciting solution to getting data from any moving object where the GPS Satellites can be received. The session will share the results gained from a number of situations studied, and display how it was done. If you have access to a GPS you too could do it.

C7 The 'Connected Classroom' (G) Repeated in D2

Gary Bass CP Software

If you had the technology, what would you do with it? The session will explore that educational possibilities of Youtube, Web2, NING, blogs, wiki and podcasting.

C8 VCE Astronomy and Astrophysics at VSSEC (C)

Ian Christie, Victorian Space Science Education Centre

This session will provide an overview of the VCE Astronomy and VCE Astrophysics programs offered by the Victorian Space Science Education Centre (VSSEC). Participants will see how both programs cover all the Key Knowledge and Skills for both of these Detailed Studies in an engaging full day program. Participants will use the Galactic Explorer software used in the VCE Astrophysics program and see how VSSEC uses the concept of the serious game to deliver scientific content.

C9 Using discussion to improve students' understanding of electric circuits (G)

Pam Mulhall, University of Melbourne and Brian McKittrick

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.

C10 StudyON for VCE Physics - Want to improve your students' exam results? (C)

Claire Lord, Jacaranda

StudyON is the next generation study, revision and exam practice tool from Jacaranda that recognises the online world students live in. In this workshop, Jacaranda will introduce you to StudyON for VCE Physics Units 3&4. Incorporating a myriad of learning tools — videos, animations, actual past VCAA exam questions, a results tracker, concept screens and interactive study activities — StudyON opens the door to a stimulating and flexible learning environment that encourages all students to study how they want, when they want.

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C11 Physics and Speech: Great things to do with Sound (3&4)

Russell Downie, PLC

This is a repeat of a session that has been presented on the last two conferences. Attendees will go away with real fun things they can do immediately with their students whenever sound is dealt with in syllabus, in general science or in Year 12 Physics. The session will focus on what our body does when we make sounds as well as other demonstrations.

C12 Enrichment Activities for Middle School Physics (G) Repeat of B6

Lynne Kelly, science author

C13 VCE Physics by Discovery (G) Repeated in E1

Jane Coyle - Marian College, Sunshine

In this session I will show how a constructivist, student-centred approach is possible in teaching senior physics. I will outline and demonstrate the way I have been teaching physics for the last ten years; spending class time on practical activities and experiments. I have attempted to remove all 'chalk and talk' from my delivery. I will give out detailed course outlines of my approach and ask participants to play with some of the simple activities I do with my students that enables them to discover the physics concepts for themselves. A CD with all of the material I use will be given to each participant. Please bring your laptop to this session.

C14 Practical Activities for Photonics (3&4)

Craig Anderson, Mark McPherson, Leongatha SC

Over the past few years, the Australian Institute of Physics (Victorian Branch) Education Committee has organised a Photonics Workshop for students that featured guest speakers and a number of practical activities. This session will focus on the practical activities from that event, providing you with a range of engaging classroom activities that are simple and relatively inexpensive. Investigating Rayleigh scattering, optical audio links, estimating the band gap energy of LED's, making your own simple optical fibre, measuring attenuation and acceptance angle are amongst the activities that will be set up on the day. Worksheets for these and other activities will be provided.

**Tea/Coffee
4.00pm**

Evening Program

** People attending the Physics Day Program can also attend the Evening Program at no extra cost. Please ensure you have made your session selections for Sessions D and E on the Registration Form.*

There is a light meal available for \$30 per person. Please indicate on your registration form if you will require a meal.

**Light Meal and Tea/Coffee
4.30pm**

Session D*

5:30pm – 6:30pm

D1 Chief Assessor's Report on the Unit 3 & 4 Exams in 2009 (3&4)

Repeat of C1

Bruce Walsh, Xavier College

D2 The 'Connected Classroom' (G)

Repeat of C7

Gary Bass CP Software

D3 The Challenge of Quantum Reality or how to teach what we don't understand! (3&4) Repeat of C5

Barry Homewood, Braemar College

D4 The virtual lab - using learning objects in VCE Physics (G) Repeat of B10

Justin Vincent, Melbourne High School

D5 Australian Synchrotron Excursion: What it offers (3&4) Repeat of A1

Jonathan de Booy, The Australian Synchrotron

Session E*

6:30pm – 7:30pm

E1 VCE Physics by Discovery (G) Repeat of C13

Jane Coyle - Marian College, Sunshine

E2 Video analysis of motion (1&2)

Repeat of B11

Gary Bass CP Software

E3 Teacher Action on Climate Change (G) Repeat of C3

Keith Burrows, AIP Education Committee

E4 The third law: minor subplot or central to the action in Newton's script? (G) Repeat of B8

Dr Christina Hart, AIP Education Committee

E5 Youtube Physics: Using online movie resources (G) Repeat of A2

Christopher Jones, University High School

**Finish
7.30pm**

Saturday Excursion Programs: A and B

There is no charge for these tours, however there is a limit on numbers and preference will be given first to interstate participants, then to regional participants. Allocations will be done on Friday, 29th January. Participants will pay for their own lunch.

Tour A:

You will be picked at Mannix College and taken to the nearby Australian Synchrotron, then onto the Soundhouse at The Arts Centre. After lunch at a Southgate restaurant you will be taken to VSSEC and then to the airport, if you are flying out. Limit: 24

The Australian Synchrotron (<http://www.synchrotron.org.au/>)

Participants will have a guided tour of the facility as well as an opportunity to see the range of practical activities that are available for secondary students to do as part of an excursion.

Brash's Soundhouse: Music Technology, New Media and Science

<http://www.theartscentre.com.au/discover/education/soundhouse.aspx>

The presentation will highlight aspects of the workshops that are available for students of all ages. Those related to physics include:

- i) A hands-on workshop designed to prepare Year 11 students for 'Sound'. It picks up on the wave aspects in the study of light, as well as aspects of the electricity and
- ii) A practical session during which students will be given demonstrations and conduct experiments at computer-based stations. The content includes microphone characteristics and loudspeaker designs.

Victorian Space Science Education Centre
(<http://www.vssec.vic.edu.au/>)

The tour explains the various student programs that VSSEC offers. Their programs provide a sensory rich, hands-on, scenario-based science experience for students from primary to senior secondary. There are also programs on Astronomy (co-ordinate systems, solar system and telescopes) and Astrophysics (models of the nature and origin of the Universe, and the life cycle of stars)

Tour B:

You will be driven from Mannix College to a nearby railway station and given a travel card and directions on how to get to the Peter MacCallum Cancer Centre in the city, and from there to the Southgate restaurant for lunch to join Tour A.

Limit: 20

Peter MacCallum Cancer Centre

The two hour program will feature a one hour talk on:

- the physics aspects of the effect of radiation on the human body and of medical technology,
 - how the technology is used in diagnosis and treatment, as well as
 - information on the training and career paths associated with medical physics.
- The second hour will be an extensive tour of the facilities at 'Peter Mac'.