

Synchrotron Investigations

How to use this resource

This comprehensive resource has been designed to highlight the importance of integrating maths and science in Australian Schools using a synchrotron as a context.

This resource package is made up of four different elements.

These are:

- teacher notes,
- student activities,
- video clips, and
- multimedia resources.

Teacher notes

These notes provide background information for teachers on the area being investigated and on student activities.

Student activities

These sections provide background information, exercises and experiment instructions for students.

Video clips

A suite of three short videos is available for students and teachers to view. They feature Dr Tim St Pierre, a leading scientist at the University of Western Australia. Dr St Pierre is currently undertaking leading-edge research on human 'iron loading' diseases in the field of medical science and biophysics. The videos illustrate: why Dr St Pierre chose a career in science; how and why he uses a synchrotron in his research; and the importance of integrating science and mathematics.

Multimedia resources

These resources are supplied to add a unique element to students' learning. In this resource there are four interactive learning objects and one PowerPoint presentation.

The PowerPoint presentation is available as an introductory tool for students. It has been designed to offer background information on the Australian Synchrotron. Student activity and teacher notes complement this.

The digital interactive learning objects allow for student exploration and experimentation. The four digital learning objects are imbedded in lessons and are as follows:

- The *Electromagnetic spectrum explorer* (section 3.1) – created to allow students to investigate the EM spectrum. Data collected from this explorer is used in student activities.
- *Light intensity explorer* (section 9.4) – has been created to introduce students to the inverse square law. This learning object can be used by students for background information or as a replacement activity to the light intensity experiment.
- *Standing waves explorer* (section 10.1) – this explorer allows students to experiment with wavelength and frequency in order to gain an understanding of waves, in particular standing waves.
- *Polygonal paths explorer* (section 11.6) – this object illustrates how polygons can be used to approximate pi. This illustrates the idea of limits and a historical view on the acceptance of pi approximation.

Other information

Throughout the resource different units of measurement are used (m s^{-1} , km hr^{-1}). This is with the intention of giving students experience in unit conversion.

In some activities (especially those in Section 12), Physics Data Sheets may be required.

The resources are available in two formats. As PDF documents or as Word documents. The Word documents are available so that teachers can make any necessary changes to allow for tailoring for the specific needs of their classes.