Project Profile

Australian Synchrotron

Photo: Australian Synchrotron

Melbourne, Victoria

Australia's only synchrotron produces powerful 'synchrotron light' with many useful properties that enable us to study the structure and properties of materials in unprecedented detail. Synchrotron x-rays and infrared light can be used in a wide range of non-destructive, high-resolution, real-time imaging and analysis techniques.

Located in Melbourne's eastern suburbs, the synchrotron is used by researchers from all over the world for experiments in areas such as medical research, mining, the environment and advanced materials.

The access to synchrotron technologies is helping Australian scientific and industrial researchers to achieve and retain positions at the forefront of their fields, boosting Australia's reputation in world scientific circles and enabling a stronger national contribution to the international development of advanced research capabilities and techniques.

A **Notifier by Honeywell** AFP-2800 analogue addressable fire detection system is installed to protect the bulk of the building and VESDA aspirating smoke detection systems are installed inside the Synchrotron and beam lines where very early warning of an impending fire is critical.

A Notifier zoned Building Occupant Warning System has also been installed to provide occupants with immediate notification of an emergency event requiring partial or total evacuation of the premises.

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What is synchrotron light?

Synchrotron light is the electromagnetic radiation emitted when electrons, moving at velocities close to the speed of light, are forced to change direction under the action of a magnetic field.

The electromagnetic radiation is emitted in a narrow cone in the forward direction, at a tangent to the electron's orbit.

Synchrotron light is unique in its intensity and brilliance and it can be generated across the range of the electromagnetic spectrum: from infrared to x-rays.

Properties of synchrotron light

Synchrotron light has a number of unique properties. These include:

High brightness: synchrotron light is extremely intense (hundreds of thousands of times more intense than that from conventional x-ray tubes) and highly collimated.

Wide energy spectrum: synchrotron light is emitted with energies ranging from infrared light to hard x-rays.

Tunable: it is possible to obtain an intense beam of any selected wavelength.

Highly polarised: the synchrotron emits highly polarised radiation, which can be linear, circular or elliptical.

Emitted in very short pulses: pulses emitted are typically less than a nano-second (a billionth of a second), enabling time-resolved studies.

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