Nuclear Physics
For: Year 12 Physics Students

Description

This program links with the 'Atoms and Nuclei' section of the 2017 SACE Stage 2 Physics curriculum. Students conduct three procedures that explore concepts of radiation and radioactive decay – calculating the half-life of an indium isotope, exploring the attenuation of gamma rays, and determining the penetrative range of beta particles through aluminium.

In addition to the above procedures, a small cloud chamber is available for demonstration purposes and can be viewed by school visitors.

The equipment in this program can also be used for design practicals.

What will Students do?

Students participate in three experimental procedures:

The Half-Life of Indium

Students:

- Use a scintillation detector and counter to record the number of gamma rays emitted by the decay of a radioactive isotope of indium
- Calculate the half-life of the isotope from the data

The Attenuation of Gamma Rays

Students:

- Use a Geiger-Muller tube and ratemeter to record the number of gamma rays penetrating progressively thickening blocks of aluminium
- Analyse the data to determine the attenuation abilities of aluminium
- Measure the attenuation capacity of a number of other materials

The Absorption of Beta Particles

Students:

- Use a Geiger-Muller tube to measure the transmission of beta-particles through increasing thicknesses of aluminium attenuators
- Calculate the penetrative range of the beta particles
- Determine the thickness of an unknown aluminium attenuator using their data

In addition to the formal procedures, students also have the opportunity to investigate levels of environmental radiation with a portable radiation counter.

The Cloud Chamber and Design Practicals
A small cloud chamber apparatus is also available and can be viewed in operation by school visitors upon request. Additionally, the equipment used in the 'Nuclear Physics' workshop can be employed for design practicals.

Contact UniSA Connect for information on these additional possibilities or to convert your program to a design practical.

Please note that requests for the cloud chamber must be made in advance of your session as it requires significant preparation.

Timetable for the Year 12 Physics Full Day Program

Nuclear Physics Workshop – 2 hours
Break – 20 mins
Campus Tour – 1 hour
Lunch – 35 mins
Physics Presentation, including Career and UniSA Course Information – 45 mins
Evaluation – 10 mins

Total – 5 hours

NB: Session details and timetable changes may occur without notice.

Conditions

- As this program is a practical activity, students and accompanying adults will be required to wear closed in shoes and appropriate dress.
- Teachers will receive confirmation of booking and pre-visit information.