# Centre for Accelerator Science (CAS)


Quan Hua using ANSTO's 1MV AMS (VEGA) accelerator

The Centre for Accelerator Science (CAS) operates four accelerators, associated beamlines, clean laboratories and has in-house expertise in ion beam analysis (IBA) and accelerator mass spectrometry (AMS).

ANSTO has operated accelerators since 1964.

CAS provides complementary capabilities to Synchrotron-based and the neutron-based research, and is a world-leading centre for ion beam analysis and accelerator mass spectrometry.

CAS is recognised internationally for the excellence of its operations and expertise of its staff. It attracts national and international users from academia, publicly-funded research agencies, industry and government.

Both in-house scientists and external users access a suite of tools for investigations that cross a range of disciplines.

CAS provides key infrastructure for supporting International Atomic Energy Agency activities and provides training across a broad range of disciplines and technologies.

## Capabilities

ion beam analysis (IBA)

accelerator mass spectrometry (AMS)

## Applications

CAS provides users access to a suite of tools in one location that can be used across:

isotopic dating

air pollution

climate science

modification and characterisation of materials

radiation damage studies

forensic science

nuclear detector characterisation

microbiological and life science studies

## Facilities

### VEGA

*1MV dedicated accelerator mass spectrometry system*

VEGA has the capability to perform high efficiency, high precision carbon-14 and actinide mass spectrometry.

### STAR

*2MV Small Tandem for Applied Research accelerator*

STAR can produce a wide range of light and medium heavy ions, with energies from a few hundreds of keV to around 6 MeV.

### SIRIUS

*6MV tandem accelerator*

SIRIUS has three ion sources include hydrogen and helium sources, and a MC-SNICS sputter source for solid materials.

### ANTARES

*10MV Australian National Tandem Research Accelerator*

ANTARES is capable of producing and accelerating virtually any naturally occurring isotope to energies over 100 MeV and ion currents of several microamperes, depending on the ion species.

11 ion sources

17 beamlines

sample preparation and chemistry laboratories

### Access

Access to CAS is available via the ANSTO User Portal at
**www.ansto.gov.au/useraccess**
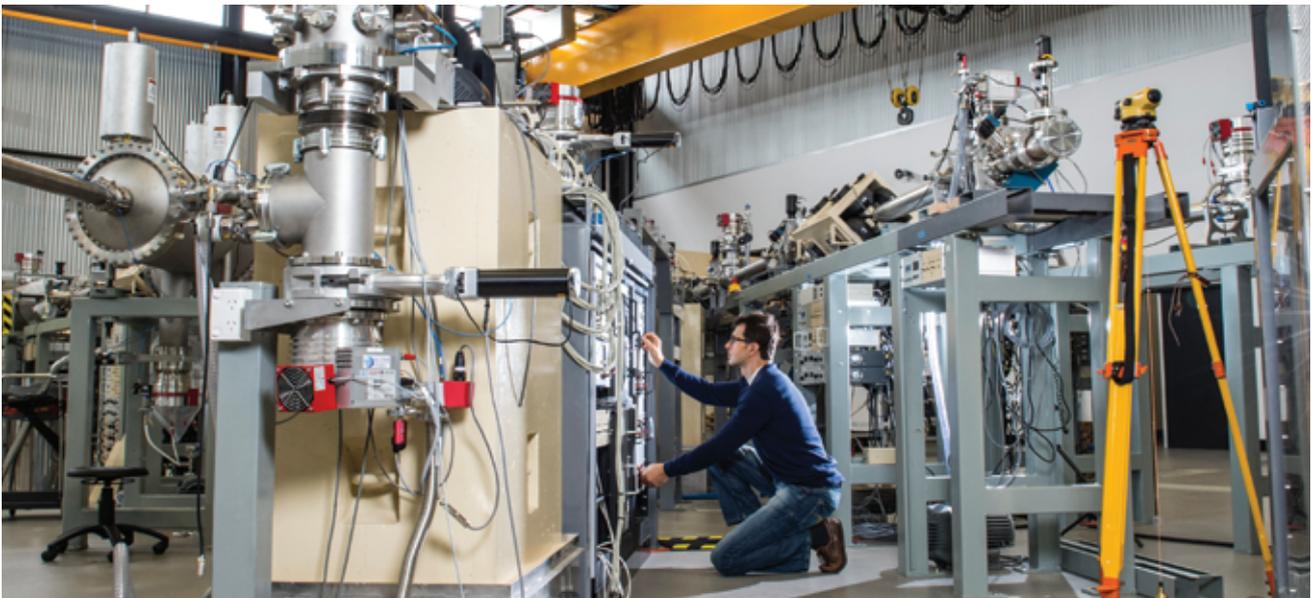
The SIRIUS 6MV accelerator is one of four accelerators making up Australia's Centre for Accelerator Science.

# Case studies

### Revealing the sources of air pollution

Nuclear techniques have been applied to 'fingerprint' air pollution, so it can be traced back to its source across cities and across nations. In short, researchers identify the origin of the particles in the pollution and its impact on our environment.

By using a combination of techniques, including analysing the particles' chemical composition and taking account of meteorological data, ANSTO researchers are able to quantify the effects of air pollution. This invaluable information provides data for policymakers making decisions affecting air quality.

### Finding sustainable water resources

ANSTO researchers are studying groundwater on Rottnest Island, Western Australia to assess the sustainability of using this underlying water as a resource long-term.

Groundwater is used during the summer months to supplement the island's other water supplies. This study uses the isotopic composition of the groundwater to determine how much groundwater there is and how quickly it is being replenished. Regular sampling and analysis is assisting in planning to meet the island's future water needs.

### Offsetting greenhouse gas emissions

Cutting edge research conducted at ANSTO is helping explain the major role marine and coastal ecosystems play in storing carbon to offset greenhouse gas emissions.

Coastal vegetation stores carbon far more effectively and permanently than terrestrial forests and freshwater wetlands, because organic carbon is often re-mineralised and thus lost to the atmosphere.

Mangrove and saltmarsh are considered the most efficient wetlands for sequestering carbon because the saline conditions inhibit the capacity of the bacteria responsible for methane (greenhouse gas) emissions.

### Stability of the Antarctic Ice Sheets

ANSTO scientists are using an innovative age dating technique to determine the timing and magnitude of ice volume reduction at various locations of the East and West Antarctic ice sheets since the last Ice Age 20,000 years ago. The results are being used to measure the contribution of melting Antarctic ice to the global sea level rise of 120 meters over that time. Using this information, glacial modelling can then better assess the likely response of the Antarctic Ice Sheet to future global warming.



Eliza Wells and Karina Meredith undertaking groundwater testing at Rottnest Island for sustainable management.