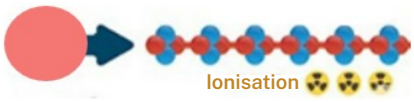
HIA
HEAVY ION ACCELERATORS

SPACE IRRADIATION BEAMLINE: SPACE RADIATION TESTING

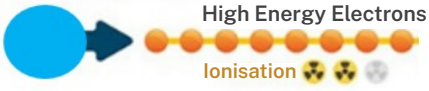
Radiation in Space

One of the **most damaging hazards faced by spacecraft is ionising radiation**, which can remove electrons from atoms in spacecraft materials, causing damage. There are three different types of ionising radiation, each consisting of a broad range of energies: charged particle, beta, and gamma radiation. While these all have ionising effects, charged particle radiation can cause the most damage due to its larger mass and energy.

The Space Irradiation Beamline at the Heavy Ion Accelerator Facility **(HIAF-SIBL)**, has been developed to emulate the charged particle radiation in space, providing industry with the capability to test for the most damaging radiation to which their systems will be exposed. This is a service that has **never previously been offered in Australia** at such high energies and with a broad range of beam species.



Charged particle radiation



Beta radiation

Gamma radiation

How do we test for charged particle radiation?

Your components will be affected by the **accumulation of radiation** known as the Total Ionising Dose (TID) as well as the possibility of **catastrophic damage from single highly ionising particles** known as Single Event Effects (SEEs). At HIAF-SIBL, we can test for both TID and SEEs under various conditions. TID testing will show the performance degradation over the mission lifetime, whereas SEE testing will show the ability of your device to withstand high-energy particles.

Image: Heavy Ion Accelerator Facility, Australian National University

Australian National University

THE UNIVERSITY OF MELBOURNE

NCRIS National Research Infrastructure for Australia
An Australian Government Initiative

NSQN

What are the capabilities of testing?

Our capabilities are unique in Australia and rare in the world. At HIAF-SIBL we work with you to provide tests based on your requirements. We provide consultation and dedicated support during the testing process.

The capabilities of HIAF-SIBL are as follows:

- Particle beams from protons of up to 28 MeV in energy, to gold ions of up to 350 MeV, with a comprehensive range of beam types and energies in between to emulate desired Linear Energy Transfer (LET) values;
- Beam intensities from 10 ions/cm^2/s up to 10^{12} ions/cm^2/s over a user-defined area (up to 40x40mm);
- You can communicate with your device electronically while it is undergoing testing via standard vacuum feed-throughs, including BNC, SMA, USB-A, RJ45 and DB 25;
- An irradiation vacuum chamber that allows the testing of large components or several test boards within a maximum size of 250 x 200 mm;
- A silicon ΔE-E telescope (i.e., 2 stacked silicon surface-barrier detectors) available for use with material/solar cell testing.

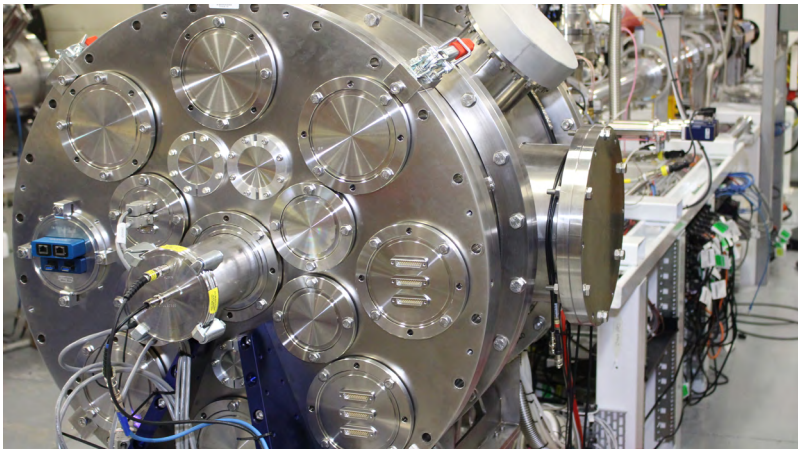


Image: Space Beamline Chamber

How do I arrange testing?

For enquiries about testing, a tour of the facility or more information, contact our **User Engagement Team** userengagement.hiaf@anu.edu.au. Our team can give you a tour, discuss your requirements and proposed tests, and guide you through the booking process.

What costs should I expect?

There are two cost components: an initial setup/consultation fee, a **one off** $2500 charge irrespective of the number of testing days, and a **daily testing fee** of $5142.40/day which represents 16 hours of testing and support from our team.

Please refer to our detailed pricing guide for more information and case studies. Please note the HIAF-SIBL does not provide a formal radiation certification but will help you understand the performance of your device or shielding material in a space-like radiation environment, to inform the next steps in reducing risks to your mission.

About us

The Space Irradiation Beamline is enabled by the Heavy Ion Accelerators (HIA) project funded through the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS). We are proud to be a founding member of the National Space Qualification Network (NSQN), which has a $1B of space qualification infrastructure for immediate, cost-effective testing and accelerated space mission design and delivery. Our capabilities are unique in Australia and rare in the world. We can emulate the space radiation environment to test your equipment under the most damaging ionising radiation conditions equivalent to those expected in orbit. Such testing presents the opportunity to reduce the risk of project failure as well as lower the cost and complexity of space missions.

Heavy Ion Accelerators

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