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The new external ion beam capability for testing of electronics suitable for harsh space radiation environments

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In 2019, the Australian Space Agency made its debut in the international scene of the space exploration. Securing the future of Australia's space sector is the core of the Advancing Space: Australian Civil space Strategy 2019-2028. This Government plan reminds that space-based technology and services not only interests space missions, but benefits all Australians daily as for weather forecasting, GPS, internet access, online banking, emergency response tracking bushfires, monitoring of farming crops, etc.
To further increase capability, the Space Infrastructure Fund (SIF) investment was issued to target 7 space infrastructure projects that involve several industries, organisations, universities, laboratories, all around the country. Mission control and tracking facilities, robotic & automation, AI command and control, space data analysis facilities, space manufacturing capabilities, and space payload qualification facilities, are the topics under study.
ANSTO together with other 5 fund recipients engaged its resources in the last-mentioned project (space payload qualification facilities), with the aim to establish the National Space Qualification Network (NSQN).
Particularly, the three ASNTO facilities Centre for Accelerator Science (CAS), the Australian Synchrotron and the Gamma Technology Research Irradiator (GATRI) will focus on enhancing and improving their capabilities for space radiation damage testing of electronics used in space and ensure they meet international standards in this area.
Space technology can be affected by cosmic radiation when Single Event Upset (SEU) occurs, knocking out temporary or permanently the instrumentation that is paramount for the successful accomplishment of a mission, a test, or simply the usual functionality of a service.
We need to deep understand the cause and the frequency of these events, in order to reduce the risk of component failure and to consequently optimizse the electronics. Tests must be performed in ground-based facilities before commercialization of any device.
ANSTO facilities use accelerators to perform radiation tests with different beams (gamma-rays, x-rays, protons and heavy ions) to eventually provide international standards of Total Ionisation Dosage (TID) radiation testing for products that can enter faster into global supply chains.
Because of the limitations encountered while performing tests in vacuum, at the CAS facility, the High Energy Heavy Ion Microprobe (HIM) of the 10MV ANTARES accelerator has recently been upgraded to an external chamber for testing standard electronic chips in an ambient-in-air environment. Advantages of an ex-vacuum microprobe are: ease of handling the sample with no limits to the dimension of the sample itself, no charge effects, more effective target heat dissipation, sampling is not required, gain in terms of time used for pump-up and down the chamber, and possibility to irradiate living system without compromising them.

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Level of Expertise

Expert

Presenter Gender

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Pronouns

Which facility did you use for your research

Students Only - Are you interested in AINSE student funding

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Condition of submission

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