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Enhancing Heavy Ion Accelerator Capabilities in Australia for Research and Industry

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Heavy Ion Accelerators (HIA) is a network of ion accelerators in Australia funded by the Australian Government's National Collaborative Research Infrastructure program. HIA supports frontier research into nuclear physics, quantum technologies, climate and environment, dark matter, astrophysics, material and space science. HIA and the unique capabilities built around them attract international users to Australia.

The largest in the network is the Heavy Ion Accelerator Facility at the Australian National University, which comprises a 14UD tandem, and a superconducting booster accelerator. In continuous operation for 50 years, the facility, which has been upgraded several times, is the only capability for experimental research and hands-on training in nuclear physics in Australia. Its national importance, demands of Australian industries and new national priorities have resulted in recent investments to upgrade and build new capabilities.

Examples of new enhancements include replacement of all ceramic acceleration tubes and posts within the tandem to increase peak achievable voltage, addition of an α-particle ion source, new control hardware and software and a beamline for testing of space-bound electronic components, devices and materials. Funded by the Australian Space Agency, the beamline is operating since 2023. I will describe some of these enhancements and the challenges in attaining them. The benefits of enhancing accelerator capabilities to industry is exemplified by the newly funded Industrial Transformation Training Centre in nuclear and radiation science –a partnership between Universities and resource, medical, quantum and space industries.

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