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X-LAB: A VERY HIGH-CAPACITY X-BAND RF TEST STAND FACILITY AT THE UNIVERSITY OF MELBOURNE

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The first Southern Hemisphere X-band Laboratory for Accelerators and Beams (X-LAB) has been commissioned at the University of Melbourne. One of the key projects within this laboratory involves repurposing half of the CERN X-band test stand XBOX3, now known as Mel-BOX.

This initiative aims to validate the performance of high-gradient travelling wave accelerating structures, crucial for the Compact Linear Collider (CLIC) beam-based acceleration baseline, operating at a frequency of 12 GHz.

To assess the structures' performance under high peak power and short pulse width RF conditions, two klystron-based test facilities have been operationalised for this year. Similar to XBOX3, Mel-BOX adopts an innovative approach to combine high average power klystron units, facilitating power distribution to two testing slots with a repetition rate of up to 400 Hz. Additionally, the parameters such as repetition rate, peak power, pulse length, and pulse shape can be tailored to meet specific testing requirements. This novel method of generating high-power, high-repetition RF pulses holds promise for various applications necessitating multiple test slots.

Moreover, there are plans to leverage this technology as a foundation for developing compact accelerators tailored for medical or university applications, including radiotherapy and compact light sources.

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