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Performance Validation of High-Gradient X-Band Structures at the University of Melbourne's X-LAB

Monday 8 September 2025 16:00 (2 hours)

The X-band Laboratory for Accelerators and Beams (X-LAB) at the University of Melbourne enables high-power testing of X-band accelerator technologies, including components for CERN's Compact Linear Collider (CLIC). At its core is Mel-BOX, a high-gradient test stand rebuilt from CERN's XBOX3. Two TD24 structures, previously conditioned at CERN, have been successfully re-tested, along with RF windows, SLED-I pulse compressors, and 3D-printed loads. Beam instrumentation at X-LAB includes Faraday cups with high-resolution digitizers to measure dark current and breakdown emissions. Fast time-domain measurements along the waveguide using GHz-bandwidth oscilloscopes allow localization of breakdown events. Optical fibers detect Cherenkov light near the structures, providing complementary pulse-resolved signals. These are cross-referenced with Faraday cup data to study early-stage field emission. X-LAB integrates RF testing and diagnostics to support the development of compact, high-gradient accelerator systems.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

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