

The southern hemisphere's first X-band radio-frequency test facility at the University of Melbourne.

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The first Southern Hemisphere X-band Laboratory for Accelerators and Beams (X-LAB) is under construction at the University of Melbourne [1]. The lab will host a CERN X-band test stand containing two 12 GHz 6 MW klystron amplifiers. By power combination through hybrid couplers and the use of pulse compressors, up to 50 MW of peak power can be sent to any of to either of the two test slots at pulse repetition rates up to 400 Hz. The test stand is dedicated to RF conditioning and testing CLIC's high gradient accelerating structures beyond 100 MV/m [2]. It will also form the basis for developing a compact accelerator for medical applications, such as radiotherapy and compact light sources. Australian researchers working as part of a collaboration between the University of Melbourne, international universities, national industries, the Australian Synchrotron -ANSTO, Canadian Light Source and the CERN believe that creating a laboratory for novel accelerator research in Australia could drive technological and medical innovation. We also gives a brief overview of the general principles of radiation protection legislation; explains radiological quantities and units, including some basic facts about radioactivity and the biological effects of radiation; and gives an overview of the classification of radiological areas at X-LAB, radiation fields at high-energy accelerators, and the radiation monitoring system used at X-LAB. The bunker design to achieve a dose rate less than annual dose limit of 1 mSv is also shown.

[1] M. Volpi et al. *The southern hemisphere's first X-band radio-frequency test facility at the University of Melbourne*. In these Proceedings IPAC21, Campinas, Brazil, 2021.

[2] N. Catalan Lasheras et al., *Construction and commissioning Xbox3: a very high capacity X-band test stand*. Conf. Proc.: 2016 IEEE Power Modulator and High Voltage Conference, San Francisco USA.