

Simulations and design of a compact beamline at the University of Melbourne X-lab

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As part of the development of the University of Melbourne X-band Laboratory for Accelerators and Beams (X-LAB) we have been advancing the conceptual design and simulations of a compact low emittance beamline to be based in the newly re-developed beam hall.

Proposed applications of the beamline include radiation dosimetry, as well as the electron source for an Inverse Compton Scattering (ICS) X-ray light source.

As part of commissioning, it is expected to use a DC photogun plus an additional bunching section for acceptance into the main accelerating section.

The main accelerating section itself is composed of two high gradient X-band linear accelerating structures operating at an expected average gradient of 70MV/m.

For the ICS X-ray source, a quadrupole focusing array is used to focus the beam to a small spot size for interaction with a laser pulse.

For this talk we shall comment on the simulation process of the beamline which utilises multiple simulation codes at various stages of the beamline, the proposed use of a DC gun and S-band accelerating segment for initial commissioning, the conceptual design of the quadrupole focusing array, and expected photon yields.

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