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Spatial dosimetric response of an ionisation chamber to kilovoltage synchrotron radiation by 2D scanning in a sub-millimetre beam

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The IMBL at the Australian Synchrotron is able to provide high-brightness kilovoltage radiation in the energy range 20 –200 keV. A PTW 30013 Farmer-type ionisation chamber was scanned through a point-like (sub-millimetre) beam and the ionisation signal from the chamber was recorded as a function of position. In this way an image was constructed from the spatial dosimetric response of the chamber. Such information can be used to determine, for example, the fraction of response from the chamber stem to the overall response of the chamber. Other interesting features include the contribution from the aluminium central electrode, and increased response where the walls are side-on to the beam (and therefore contribute a greater number of secondary electrons to the air cavity). The results are compared to a Monte Carlo model. Dosimetric response maps should be useful for investigating the design of ionisation chambers for radiotherapy.

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ionisation chamber, radiotherapy, dosimetry

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