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Quantitative characterisation of the white/ pink X-ray beam at the Australian Synchrotron Imaging & Medical Beamline (IMBL)

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A critical phase for any synchrotron beamline involves detailed testing, characterization and commissioning; this is especially true of a beamline as complex as the Imaging & Medical Beamline (IMBL) [1-3]. IMBL staff and expert users have been performing precise experiments aimed at quantitative characterization of the primary white/ pink X-ray beam, with particular emphasis placed on the wiggler insertion devices (IDs), the primary-slit system and any *in-vacuo*/ *ex-vacuo* filters.

We will describe our findings from these studies. Such results will benefit future IMBL users, especially those for whom detailed knowledge of the X-ray beam spectrum (or "quality") and flux density is important. This information is critical for radiotherapy/ radiobiology users, who need to know (to <5%) what X-ray dose/ dose rate is being delivered to their samples.

We account for various correction factors associated with ionization-chamber dosimetry, e.g. recombination, electron loss. A new and innovative approach is developed, which provides confirmation of key parameter values such as the magnetic field in the wiggler and the effective thickness of key filters. IMBL commenced operation in December, 2008 with an Advanced Photon Source wiggler. A superconducting multi-pole wiggler was installed and operational in January, 2013. Results are presented for both of these IDs.

[1] – A. W. Stevenson, et al., *J.Synch.Rad.*, **17**, 75-80 (2010).
[2] – A. W. Stevenson, et al., *J.Synch.Rad.*, **19**, 728-750 (2012).
[3] – J. C. Crosbie, et al., *Med.Phys.*, **40**, 062103 (9pp) (2013).

Keywords

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