Design of an Undulator White Beam Profiler and Test Results on the APS Beamline

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At the Advanced Photon Source (APS), each insertion device (ID) beamline front end has two x-ray beam position monitors (XBPMs) to monitor the x-ray beam position for both the vertical and horizontal directions. The XBPMs measure photoelectrons generated by the CVD-diamond-based sensory blades and deduce the beam position by comparison of the relative signals from the blades [1].

Performance challenges for an undulator XBPM during operation are contamination of the signal from the neighbouring bending-magnet sources and the sensitivity of the XBPM to the ID gap variations. Problems are exacerbated because users change the ID gap during their operations, and hence the percentage level of the contamination in the front-end XBPM signals varies. The smart XBPM system partially solved these problems [2], but it is still very difficult to eliminate the contamination of the signal from the storage ring orbit-corrector magnets. A method was proposed by G. Decker and O. Singh [3] that provides a solution to the long-standing problem of stray radiation-induced signals on photoemission-based XBPMs located on ID beamline front end. The method involves the introduction of a chicane into the accelerator lattice that directs unwanted x-rays away from the photosensitive XBPM blades. This technique has been implemented at the APS. In this paper, we present the design of an undulator white beam profiler that provides experimental confirmation of this technique.

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References


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