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White X-ray beam position monitor for coherent soft X-ray beamlines

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A novel soft X-ray BPM (sXBPM) for high-power white beams of synchrotron undulator radiation has been developed through a joint effort of BNL/NSLS-II and Stony Brook University. In our approach, custom-made multi-pixel GaAs detector arrays are placed into the outer portions of the X-ray beam, and the beam position is inferred from the pixel photocurrents. Our goal is to achieve micron-scale positional resolution without interfering with user experiments, especially the most sensitive ones exploiting coherent properties of the beam. An elaborate mechanical system, which provisions for possible intercepts of kW-level beam in abnormal conditions, has been designed, fabricated, and installed in the 23-ID canted undulator beamline first optical enclosure. Separately, GaAs detectors with specially tailored spectral response have been designed, fabricated, and tested in the soft and hard X-ray regions at two NSLS-II beamlines. The paper gives an overview of the sXBPM system, presents the first results from the high-power white X-ray beam, and explains why our approach can be beneficial for XBPMs in future light sources with highly coherent beams.

Footnotes

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