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The use of online photon beam position measurements to improve synchrotron performance

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For users to take advantage of the low emittance and high coherence photon beams produced at synchrotron light sources, sub-micron source-point stability is desired over timescales from milliseconds to hours. However, it is insufficient to only monitor the source electron beam; the X-ray beam itself must be monitored and, where required, included in feedback loops to meet the stringent requirements of beamlines and users. Variations in the photon flux intensity or profile can severely reduce the quality of the X-ray data collected, thus it is important to make accurate, online, and preferably non-destructive measurements of the photon beam itself. The use of photon beam diagnostics at synchrotrons is well-established, and is an essential tool to commission, optimise, and improve the light delivered to users. This paper reviews various photon diagnostics techniques in use at different synchrotrons, and discusses how their measurements are applied to improve both machine and beamline performance.

Primary author: BLOOMER, Chris (Diamond Light Source Ltd.)

Presenter: BLOOMER, Chris (Diamond Light Source Ltd.)

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