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EPICS-based X-ray beam intensity monitoring for the CBXFEL project at SLAC LCLS

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The Cavity-Based X-ray Free-Electron Laser (CBXFEL) project, to be deployed in the Linac Coherent Light Source (LCLS) Hard X-ray (HXR) undulator line, aims to produce a highly coherent X-ray beam by recirculating X-ray pulses within a cavity. Precise alignment of the diamond crystal mirrors in this cavity is critical to achieving optimal CBXFEL performance. To support this, we deploy a system of five silicon-based X-ray Beam Intensity Monitors (XBIMs) and one diamond XBIM. Each XBIM generates a signal that may be amplified and is then digitized using high-speed digitizers. These digitized values are integrated into the EPICS control system, enabling synchronized data acquisition, feedback, and monitoring alongside other experimental subsystems. This paper outlines the requirements for CBXFEL beam diagnostics, details the digitizer selection and configuration, and describes the implementation of the control architecture.

Footnotes

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