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Upgrading hard X-ray experimental instruments controls for LCLS-II-HE: enabling high repetition rate science

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The Linac Coherent Light Source (LCLS) at SLAC National Accelerator Laboratory has been undertaking a major project that builds on the foundation of the LCLS-II project. The LCLS-II High Energy (LCLS-II-HE) upgrade is designed to push the capabilities of LCLS-II even further by increasing the energy of its superconducting accelerator to 8 GeV (up from ˜4 GeV), enabling the production of even shorter and more intense X-ray pulses for cutting-edge scientific experiments.
One of the project's Key Performance Parameters is the delivery of a high-repetition-rate capable Hard X-ray (HXR) experimental instrument that can perform experiments with the LCLS-II-HE beam. Meeting this requirement has driven the need to upgrade the existing HXR experimental control system.
This talk will focus on the scope and progress of that upgrade effort, which builds on the LCLS-II controls architecture integrating new hardware and software components. A major part of the upgrade includes the implementation of the Preemptive Machine Protection System (PMPS), which is integrated across all key control subsystems including motion, optics and vacuum to ensure safe beam delivery. The upgraded system is also designed to support dual-mode operation and beamline multiplexing to meet evolving experimental demands.
In addition, as the project approaches installation and transitions into its final phase, the challenges encountered and mitigation implemented to ensure successful delivery will be presented.

Footnotes

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