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The CBXFEL control system: bringing new technologies into the SLAC LCLS accelerator control system

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The Cavity-Based Free Electron Laser (CBXFEL) project is proposing to produce a recirculating X-ray cavity and deploy it to the SLAC LCLS (Linac Coherent Light Source) Hard X-ray (HXR) undulator line. The objective of the project is to demonstrate multi-pass gain and to eventually increase peak brightness of the produced X-ray beam. To support this novel application, new electronics and control system architectures have been adopted and integrated into the LCLS accelerator control system. This includes nanoscale precision multi-axis motion control, high-precision in-vacuum temperature control, high-speed and high-resolution USB cameras, and high-speed digitizers. Moreover, the existing accelerator network, vacuum, timing, and machine protection system (MPS) control systems were expanded to support the new devices. This paper describes the main requirements to be met, how the technologies were integrated into the accelerator control system, and the main lessons learned.

Footnotes

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Author: MONTIRONI, Maria Alessandra (SLAC National Accelerator Laboratory)

Co-authors: LUTMAN, Alberto (SLAC National Accelerator Laboratory); HALAVANAU, Aliaksei (SLAC National Accelerator Laboratory); LE, An (SLAC National Accelerator Laboratory); SHETTY, Arjun (SLAC National Accelerator Laboratory); CURTIS, Courtney (SLAC National Accelerator Laboratory); SANCHEZ, Daniel (SLAC National Accelerator Laboratory); SHU, Deming (Argonne National Laboratory); ZHU, Diling (SLAC National Accelerator Laboratory); LANZA, Giulia (SLAC National Accelerator Laboratory); NUHN, Heinz-Dieter (SLAC National Accelerator Laboratory); MOCK, Jeremy (SLAC National Accelerator Laboratory); BALCAZAR, Mario (SLAC National Accelerator Laboratory); WHITE, Marion (Argonne National Laboratory); DUNNING, Michael (SLAC National Accelerator Laboratory); BALAKRISHNAN, Namrata (SLAC National Accelerator Laboratory); LINDBERG, Ryan (Argonne National Laboratory); STEIN, S Joshua (Argonne National Laboratory); KARIMIAN, Sherwin (SLAC National Accelerator Laboratory); SARAF, Shweta (SLAC National Accelerator Laboratory); THAYER, Tom (SLAC National Accelerator Laboratory); LEWIS, Wayne (SLAC National Accelerator Laboratory); PERMANYER, Xavier (SLAC National Accelerator Laboratory); SHVYD'KO, Yuri (Argonne National Laboratory); HUANG, Zhirong (SLAC National Accelerator Laboratory)

Presenter: MONTIRONI, Maria Alessandra (SLAC National Accelerator Laboratory)

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