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The LCLS-II beam loss monitor readout system

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The Linac Coherent Light Source II (LCLS-II) is a new addition to the SLAC accelerator complex. It is a 4 GeV, 120 kW superconducting Linac operating in continuous RF mode at 1.3 GHz with a beam repetition rate of up to 1 MHz. The prior generation of protection system beam loss monitors, whose operation is based on ion collection principles, are not suitable for operation in LCLS-II due to their slow recovery times. A new group of detectors have been identified and evaluated. These fall into three categories: scintillation detectors using optical fibers and photomultiplier pickups for distributed losses. Point detectors based on diamond pickups, and YAG:ce screens with photodiode pickups for burn through detection. These new detector elements require that new readout and signal processing electronics to be developed. In addition, because these detectors are part of the SLAC Beam Containment System (BCS), a certified safety system, a self-check mechanism is required to continuously verify the health of the detector and readout. This paper describes the design, operation and performance of the readout electronics.

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