The Beams and Applications Seminar Series

Beam Loss Monitor System for the LCLS Undulators

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Bldg. 401, Room B2100
Friday, September 11, 1:30 PM

Host: Louis Emery, ASD

Preserving magnetic field quality in permanent-magnet undulators, such as those in the LCLS, is critical. Radiation from high-energy electrons can cause magnets to be demagnetized, thus undulator protection is necessary. The LCLS machine protection system (MPS) includes an array of Cherenkov-detector beam loss monitors (BLMs), designed and built by Argonne, that are sensitive to fast electrons. MARS simulations were conducted to help calibrate BLM output with radiation dose in the magnets. Two types of loss scenarios were studied: beam strike on a 1-μm thick aluminum OTR foil and on a 40-μm carbon beam finder wire (BFW). Five BLMs were installed in the LCLS tunnel and tested with beam during an April commissioning run. Argonne's BLMs demonstrated excellent sensitivity and low noise. The effect of an OTR screen inserted 1.5km upstream was observable in the BLMs. BLM-calibration studies were conducted in the APS booster-to-storage-ring transfer line (BTS). An LCLS BLM radiator was placed within Pb shielding near the BTS beam dump and was also modeled with MARS. The BLMs, simulations, calibration processes, and beam test results at APS and LCLS are described.

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