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On the way to design fast beam loss monitor for Machine-Detector Protection at EIC: Test results at RHIC

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Rapid detection of beam losses is essential at large-scale HEP/NP facilities to protect sensitive components from the damaging effects of unstable high-energy beams. To address this for the EIC, we deployed a prototype beam loss monitoring (BLM) system at Relativistic Heavy Ion Collider (RHIC), designed to test fast abort capabilities with response times on the order of a single beam revolution.

We will present results of beam loss measurements at the 2025 RHIC run utilizing scintillating light and CVD diamond detectors. Since July 16, 2025, the system has operated stably, recording bunch-by-bunch loss data consistent with expectations and independently measured profiles from C-AD BLMs. Preliminary results show strong correlation with nominal beam conditions, with peak loss rates up to kHz level. The talk will include details of signal processing, time structure analysis, and detector response characterization under both single-beam and collision conditions.

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