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Beam lifetime monitoring using beam loss monitors during LHC Run 3

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The Beam Loss Monitoring (BLM) system of the Large Hadron Collider (LHC) at CERN is essential for the protection of machine elements against energy deposition from beam losses. Employing around 4000 detectors placed around the 27-km LHC ring, the BLM system measures secondary particles continuously and can trigger beam extraction in less than 3 turns, in case the signals exceed certain predetermined thresholds. Thanks to its high dynamic range and sensitivity, a signal-to-lost-particle calibration of this system is suited to provide accurate information about the LHC beam loss patterns. This includes online monitoring of the beam lifetime and even the identification of the plane of losses, making it an asset to follow up the performance of the accelerator.

In this contribution the principle of the monitor calibration is explained, as well as a description of the machine tests used to acquire the calibration data. Finally, an analysis of the beam lifetime during the first year of the LHC Run 3 is presented together with examples of selected LHC fills.

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Footnotes

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Yes

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