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BLM signal thresholds for ion operation during the LHC Run 3

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In 2024, the Large Hadron Collider (LHC) delivered Pb-Pb ion collisions at a beam energy of 6.8 Z TeV with a stored beam energy of more than 20 MJ. In order to clean beam halo particles and avoid quenching the LHC superconducting magnets, a novel collimation method employing a few mm-long crystals was introduced for ion operation in the LHC Run 3. Additionally, the Beam Loss Monitoring (BLM) system is in charge of monitoring the beam losses all around the ring and triggering the beam dump in case they are above certain predetermined thresholds. These BLM signal thresholds are based on the expected loss scenarios for proton beams, which make up most of the LHC operation time. However, Pb ion operation with the use of crystal collimators leaves different beam loss patterns with respect to the standard collimation hierarchy, requiring the adjustment of the BLM signal thresholds to ensure a safe operation while maximizing the machine performance. This contribution explains the newly observed beam loss patterns during Pb ion operation with crystal collimation in place, as well as the study that was carried out to update the BLM thresholds for Pb ion operation in the LHC Run 3.

Footnotes

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I have read and accept the Conference Policies

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