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Correlating Start-of-ramp Losses with Beam Observables at Flat-bottom in the LHC

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Power limitations are expected at injection energy for the main Radio Frequency (RF) system due to the doubled bunch intensity in the High Luminosity (HL-) Large Hadron Collider (LHC) era. One way to overcome these power limitations is to reduce the capture voltage. The smaller RF bucket, however, leads to increased beam losses at the start of the ramp. In practice, these beam losses, which contain both capture and flat-bottom losses, can trigger beam dumps if any of the Beam Loss Monitor (BLM) thresholds are reached. In this contribution, the correlation between start-of-ramp beam loss and beam observables before the ramp is investigated by analysing Beam Current Transformer (BCT) measurements from physics fills. Estimates of how the maximum ratio to BLM dump threshold scales with longitudinal losses are also made. The aim is to make predictions for operation at higher bunch intensities on the basis of these correlations in view of the intensity ramp up for the HL-LHC era.

Footnotes

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Europe

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