Contribution ID: **731** Contribution code: **WEPS018** Type: **Poster Presentation**

Bunch length regulation in the LHC during controlled emittance blow-up

Wednesday 4 June 2025 16:00 (2 hours)

Controlled longitudinal emittance blow-up is indispensable for the operation of the Large Hadron Collider (LHC) to counteract single-bunch loss of Landau damping during the acceleration ramp. The blow-up is performed by injecting RF phase noise in a narrow frequency band into the beam phase loop, with bunch-length feedback regulating the noise amplitude. In 2024, the variation of the bunch length due to imperfect regulation caused unacceptable beam-induced heating of certain accelerator components. In this contribution, we present the results of extensive simulation scans that have been used to optimize the feedback parameters. We show how this optimization, along with a reduction of the feedback delay on the controls side, has been implemented in the LHC and significantly improved the bunch length evolution during acceleration. Finally, we discuss the results of a measurement scan performed during an operational period of five weeks to fine-tune the blow-up feedback settings.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

Funding Agency

Author: GALLOU, Niki (European Organization for Nuclear Research)

Co-authors: BIELAWSKI, Bartosz Przemyslaw (European Organization for Nuclear Research); TIMKO, Helga (European Organization for Nuclear Research); JAUSSI, Michael (European Organization for Nuclear Research)

Presenter: GALLOU, Niki (European Organization for Nuclear Research)

Session Classification: Wednesday Poster Session

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D09 Emittance manipulation, Bunch Compression and Cooling