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Energy deposition in the new SPS scrapers

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The successful injection of proton beams into the Large Hadron Collider (LHC) depends on an efficient scraping mechanism in the Super Proton Synchrotron (SPS). The beams accelerated in the SPS contain a significant non-Gaussian tail population. If not removed, this transverse tail population can cause high losses in the transfer lines and in the LHC injection elements. Subsequently, the Beam Loss Monitor (BLM) system may trigger a beam dump reducing the machine availability. As beam intensities increase to meet the parameters set by the LHC Injector Upgrade (LIU), the efficiency of the scraping operation becomes increasingly crucial. To fully cope with higher beam intensities in the framework of the High-Luminosity LHC (HL-LHC) project, an upgrade of the scraper system, consisting of two movable graphite blades, is being developed and scheduled for installation in January 2025. This article presents the results of a comprehensive simulation study that employs the FLUKA code coupled with SixTrack to assess energy deposition in the scrapers.

Footnotes

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Region represented

Europe

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