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Protection of extraction septa during asynchronous beam dumps in HL-LHC operation

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The LHC beam dump system was developed to safely and reliably dispose of the LHC beams at the end of physics fills or in case of emergency aborts. The beams are extracted by means of kicker magnets, deflecting the beams horizontally, and septa, which provide a vertical kick. The system must be able to cope with rare failure scenarios, such as an asynchronous beam dump, where the rise time of the extraction kickers is not synchronized with the $3 \mu\text{s}$ long particle-free abort gap. This type of event would lead to bunches impacting on downstream accelerator equipment if not properly absorbed by a system of beam-intercepting devices. In the High Luminosity-LHC (HL-LHC) era, the protection absorbers have to withstand significantly higher bunch intensities of up to $2.3 \cdot 10^{11}$ protons. In this paper, we study the robustness and protection efficiency of the septum protection absorbers for HL-LHC operation. In particular, we present energy deposition simulations for the absorber blocks and downstream equipment and define the required absorber upgrades for HL-LHC.

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Footnotes

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Yes

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