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TDE (20' + 5')

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Two 6-t beam dumps, made of a graphite core encapsulated in a stainless steel vessel, are employed to absorb the energy of the two Large Hadron Collider (LHC) intense proton beams during operation. Operational issues started to appear in 2015 during LHC Run 2 (2014-2018) as a consequence of the progressive increase of the LHC beam kinetic energy, requiring technical interventions in the highly radioactive areas around the dumps. Nitrogen gas leaks appeared after highly energetic beam impacts and instrumentation measurements indicated an initially unforeseen movement of the dumps. A computer modelling analysis campaign was launched to understand the origin of these issues, including both Monte Carlo simulations to model the proton beam interaction as well as advanced thermo-mechanical analyses. The main findings were that the amount of instantaneous energy deposited in the dump vessel leads to a strong dynamic response of the whole dump and high accelerations (above 2000g). Based on these findings, an upgraded design, including a new support system and beam dump windows, was implemented to ensure the dumps' compatibility with the more intense beams foreseen during LHC Run 3 (2022-2025) of 539 MJ per beam. The contribution will review the refurbishment of the core, the current spare strategy, any potential limitations in view of Run 3 and the technical activities supporting the operation in Run 3.

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