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Status of beam-beam studies for the high-luminosity LHC

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Optimizing the configuration of an operational cycle of a collider such as the LHC is a complex process, requiring various simulation studies. In particular, Dynamic Aperture (DA) simulations, based on particle tracking, serve as indispensable tools for achieving this goal. In the framework of the high-luminosity LHC (HL-LHC) studies, our primary focus lies in performing parametric beam-beam DA simulations for the critical phases of the collision process, which includes the collapse of the beam separation bump, as well as the start, and the end of the luminosity leveling. In this paper, we present the status of our ongoing studies for different optics and filling schemes, and we comment on how they could guide the orchestration of the operational settings along the luminosity leveling phase of the HL-LHC cycle.

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