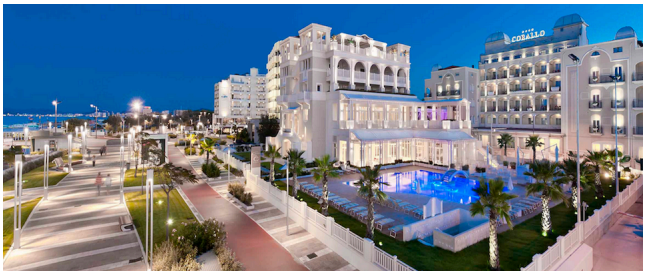

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Simulations of crystal collimation processes for 6.8 Z TeV lead ion beams at the LHC

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In future heavy-ion runs of the Large Hadron Collider (LHC), the stored beam energy is planned to increase and reach values above 20 MJ. This requires improving the performance of the betatron collimation system. The solution found is to use crystal channeling to reduce nuclear fragmentation and guide halo particles safely to an absorber. Crystal collimation is part of the HL-LHC baseline and is being deployed already for LHC Run 3 (2022-2025). For a successful implementation of this novel scheme, it is very important to develop simulation tools to model accurately the complex non-linear halo dynamics in the ring, as well as the interactions with the crystal and the conventional collimators along the ring. The development of a well-tested simulation setup is also instrumental to study in detail optimal crystal configurations. This paper presents the latest progress and improvements regarding circulating-beam simulations, addressing the benchmark tests performed and the expected future performance of operational configurations at the LHC.

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