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Collimation + technical implementation

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Modern accelerators cannot operate high intensity hadron beams without adequate beam collimation systems that are designed to dispose safely and efficiently of unavoidable losses in each phase of the beam operation. This is in particular the case for hadron colliders that rely on super-conducting magnets to push beam energy and current, like the Large Hadron Collider (LHC). In this case, the tiny energy amounts sufficient to spoil the super-conducting state is several orders of magnitude below the total stored beam energy, calling for very efficient beam collimation. Uncontrolled beam losses also risk to damage permanently accelerator equipment, which must be avoided to ensure a high-availability operation. In this contribution, the design of a multi-stage collimation system is reviewed, discussing typical target specifications, design criteria and performance. Modern tools used to study and characterize collimation systems are briefly introduced. The LHC collimation system is presented as a case study, covering also its technical implementation and collimation operational aspects.

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