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## Crystal collimation of heavy ion beams

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An important upgrade programme is planned for the collimation system of Large Hadron Collider (LHC) for lead-ion beams that will already reach their high-luminosity target intensity upgrade in the LHC Run 3 (2022-2025). While certain effects like e-cloud, beam-beam, impedance, inject and dump protection are relaxed with ion beams, halo collimation becomes a challenge, as the conventional multi-stage collimation system is about two orders of magnitude less efficient than for proton beams. Ion fragments scattered out of the collimators in the betatron cleaning insertion risk to quench cold dipole magnets downstream and may represent performance limitations. Planar channeling in bent crystals has been proven effective for high energy heavy ions and is now considered as baseline solution for collimation at High-Luminosity LHC (HL-LHC). In this paper, simulation and measurement results, demonstrating the observation of channeling of heavy-ion beams and improvement of collimation cleaning in the multi-TeV energy regime, and the efficiency of the collimation scheme foreseen for HL-LHC are presented.

### Footnotes

### Funding Agency

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**Primary author:** REDAELLI, Stefano (European Organization for Nuclear Research)

**Presenter:** REDAELLI, Stefano (European Organization for Nuclear Research)

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