

Collimators—the LHC's bodyguards

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Installation of a collimator in the LHC. Collimators protect the sensitive equipment from escaping particles. Credit: Maximilien Brice, Julien Ordan/CERN

The performance of the LHC relies on accelerating and colliding beams made of tiny particles with unprecedented intensities. If even a small fraction of the circulating particles deviates from the precisely set

trajectory, it can quench a super-conducting LHC magnet or even destroy parts of the accelerator. The energy in the two LHC beams is sufficient to melt almost one tonne of copper.

This is why the LHC shows its teeth every time particles misbehave. These "teeth" are part of special devices around the LHC, called collimators. Their jaws – moveable blocks of robust materials – close around the [beam](#) to clean it of stray particles before they come close to the collision regions. The materials the jaws are made of can withstand extreme conditions of temperature and pressure, as well as high levels of radiation.

More than a hundred of these bodyguards are placed around the LHC. They are also installed on each side of the LHC experiments to absorb the stray [particles](#) before they come close to the collision regions.

With the expected increase in the number of particle collisions in the High-Luminosity LHC, the beam intensity will be much higher. New collimators are being developed by CERN's Engineering department to meet the beam-cleaning requirements of the future project. Some of the recent innovations in the LHC collimation system include a wire and a crystal collimator.

Provided by CERN

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