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## Design of CMS Beam Halo Monitor system

A fast and directional monitoring system for the CMS experiment is designed to provide an online, bunch-by-bunch measurement of beam background induced by beam halo interactions, separately for each beam. The background detection is based on Cherenkov radiation produced in synthetic fused silica read out by a fast, UV sensitive photomultiplier tube. Twenty detector units per end will be azimuthally distributed around the rotating shielding of CMS, covering  $\sim 408$  cm<sup>2</sup> at 20.6m from the interaction point, at a radius of  $\sim 180$  cm. The directional and fast response of the system allows the discrimination of the background particles from the dominant flux in the cavern induced by pp collision debris, produced within the 25 ns bunch spacing. A robust multi-layered shielding will enclose each detector unit to protect the photomultiplier tube from the magnetic field and to eliminate the occupancy from low energy particles. The design of the front-end units is validated by experimental results. An overview of the new system to be integrated in CMS during the current shutdown of LHC will be presented, and its perspective for monitoring in High Luminosity LHC.

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