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Machine Protection System(s) - Overview

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Safe operation of the LHC requires coherence across several systems for machine protection: collimators and beam absorbers, beam dumping system, beam monitoring, beam interlocks, etc. Beam operation requires beam permit that can only be established when all LHC systems are ready for beam operation. Extraction of beam from the SPS and transfer to the LHC requires correct settings of the extraction and injection systems as well as the transfer line elements. When operating with beam, many different type of failures could lead to accidental beam losses. Failures are detected by the quench protection system and other hardware related equipment. Consequences of failures on the beam are detected by beam loss monitors and other beam instruments. This results in a beam dump request transmitted via the beam interlocks to the beam dumping system, that extracts the beam into the dump block. The functionality of the LHC systems with respect to machine protection is presented. The overall strategy of the LHC machine protection is discussed. Main emphasis is on the interfaces and dependencies between the systems.

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