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Safe Injection into the LHC

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The LHC injection process comprises extraction from the SPS, transfer through the transfer lines TI2 and TI8 and finally injection into the LHC in IR2 and IR8. The nominal intensities foreseen for injection are well over an order of magnitude above the damage limit. Equipment failures resulting in beam loss will therefore cause severe damage to the SPS, the transfer lines or the LHC. Effective active (interlock) and passive (collimator) machine protection is therefore essential. The consequences of various failures such as kicker erratics, power converter faults, etc. have been investigated for beam 2 with particle tracking using a full aperture model of the transfer line and the injection region. Mechanical and optical imperfections of the line and injection region were taken into account. The requirements for active protection by surveillance of key equipment and passive protection (TCDI, TDI-TCLI) are presented. Consequences for the commissioning phase of the LHC are discussed in the context of the likely LHC commissioning strategy.

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