

Title: Overview of the protection and shielding studies for the betatron cleaning insertion at LHC.

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Abstract

The 350 MJ of stored beam energy at LHC and the small spot size at 7 TeV/c poses strict requirements for the collimation system. Two insertions (IR3, IR7) are dedicated to beam cleaning with the design goals of absorbing part of the primary beam halo and of the secondary radiation. The tertiary halo which escapes the betatron cleaning insertion in IR7 may heat the cold magnets at unacceptable levels, if no additional absorber is used. Moreover, the transverse energy and intensity carried by the beam lays three orders of magnitude above the values of current facilities thereby requiring careful calculations of the heat deposition in the collimators and in other fragile units. The present paper provides an overview of the intense study by means of FLUKA simulation to shield and protect all sensitive equipment against overheating and radiation damage in the harsh environment of IR7 during normal collimation and for various accident scenarios.