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Challenges for the SIS100 emergency beam dump system

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The heavy ion synchrotron SIS100 is the flagship accelerator of the Facility for Antiproton and Ion Research (FAIR) currently under construction at GSI, Darmstadt. It will provide high intensity beams of particles ranging from protons to uranium ions at beam rigidities up to 100 Tm. Part of the machine protection system is an emergency beam dump that is partly inside the vacuum system and partly outside. Due to the beam dump's tight integration with the beam extraction system, there is little flexibility for design of the dump or beam optics defining the shape of the impacting beam. High energy deposition densities and the wide range of accelerated ions pose unique challenges to the survival of the dump. In this paper we identify the most demanding beam impact scenarios for the different dump components that will consequently guide choices for materials and design.

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