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## **Fast Transient Beam-Matter Interactions at the European Spallation Source**

The beam intercepting devices in the linac at the European Spallation Source (ESS) include the spallation target, proton beam window, tuning dump, beam stoppers, and a number of beam instrumentation devices such as faraday cups, wire scanners, grid monitors, and halo monitors. These devices interact with intense proton beam, intercepting protons with kinetic energies up to 2 GeV and transient beam currents up to 62.5 mA, and they suffer from beam loads of transient nature due to beam pulses, beam trips and beam raster. In order to improve the functionality and reliability of beam intercepting devices, it is important to understand the physics of fast-transient responses of the constituent materials to the proton beam of dynamic character. The HiRadMat facility provides a unique opportunity to perform experiments on fast-transient beam-matter interactions, which is crucial for engineering of beam intercepting devices at high power spallation sources. The physical phenomena that can be studied using HiRadMat include, for example, beam induced thermo-mechanical response, change of lattice structure, beam collision driven release of recoil particles, solid transmutation, and gas production. In this talk, after a brief introduction of beam intercepting devices at ESS, the potential future research areas where HiRadMat facility could be utilized for the upgrade of these systems are presented.

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