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The CERN High Energy Accelerator Mixed Field (CHARM) facility in the CERN PS East Experimental Area

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The CERN High Energy Accelerator Mixed Field (CHARM) facility is currently constructed in the CERN PS East Experimental Area to study radiation effects on electronic components. The foreseen location has become available due to the decommissioning and subsequent dismantling of the DIRAC experiment and the CHARM facility will share it with a proton irradiation facility that is situated further upstream.

The CHARM facility will receive a primary proton beam from the CERN PS (Proton Synchrotron) at a beam momentum of 24 GeV/c and a maximum average beam intensity of 6.7E10 protons/second with a maximum pulse intensity of 5E11protons/pulse and a respective pulse length of 350ms. The beam will impinge on one out of a set of dedicated targets to produce the desired radiation fields at several experimental positions. These radiation fields can be adjusted by insertion of up to four moveable shielding walls, two made out of concrete and two made out iron. The main purpose of the CHARM facility will be the investigation of the effects of these radiation fields on electronic components in the framework of the Radiation to Electronics (R2E) project.

First, the radiation field requirements on the CHARM facility by the R2E project are discussed. Then, the radiological assessment of the facility is presented, including the shielding design for the prompt radiation, the derived radiation monitoring system and the optimization of the residual radiation. Furthermore, the air activation calculations, the resulting radiological impact from the release of radionuclides to the environment and the derived requirements for the dynamic confinement of the air inside the CHARM facility are illustrated.

The shielding of the CHARM facility will also include the CERN Shielding Benchmark Facility (CSBF) situated laterally above the target. This facility will allow deep-penetration benchmark studies of various shielding materials. The current plans for the construction and the commissioning of the CSBF will be outlined.

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