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XFEL Machine Protection System (MPS) Based on MicroTCA

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The European X-Ray Free Electron Laser (XFEL) linear accelerator will provide an electron beam with energies of up to 17.5 GeV and will use it to generate extremely brilliant pulses of spatially coherent xrays. With a designated average beam power of up to 600 kW and beam spot sizes down to few micrometers, the machine will hold a serious damage potential. To ensure safe operation of the accelerator it is necessary to detect dangerous situations by closely monitoring beam losses and the status of critical components. This is the task of the MicroTCA based machine protection system (MPS). Many design features of the system have been influenced by experience from existing facilities, particularly the Free Electron Laser in Hamburg (FLASH), which is a kind of 1:10 prototype for the XFEL. A high flexibility of the MPS is essential to guarantee a minimum downtime of the accelerator. The MPS is embedded in the DOOCS* control system.

DOOCS: Distributed Object Oriented Control System

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