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IFMIF-DONES advanced machine protection system

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The International Fusion Materials Irradiation Facility-DEMO-Oriented Neutron Source (IFMIF-DONES), a cutting-edge accelerator-based neutron source for fusion materials research. IFMIF-DONES Facility Project involves a particle accelerator that produces a deuterium beam of 40 MeV and 125 mA, impacting on a flowing liquid lithium target, generating the neutron source by called nuclear stripping reaction, therefore a robust central control system for safe and efficient operation is required. IFMIF-DONES Central Instrumentation and Control System (CICS) focuses on three groups of systems: CODAC (Control, Data Acquisition, and Communication), responsible for overall coordination and data management; MPS (Machine Protection System), ensuring machine protection; and SCS (Safety Control System), implementing safety functions for personnel and the environment. The work presents the current design focused only on robust central MPS interlock signals for safe, reliable and efficient protection of the machine. The MPS design describes advanced technology and fast interlock propagation, based on hierarchical, modular, and scalable architecture with built-in redundancy. The MPS system shall be able to respond in a maximum time of 10 µs, acting over the accelerator systems and the lithium systems.

Footnotes

IFMIF-DONES, CICS, MPS, interlock, fast control, real-time control, fusion energy

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