



THE PERSONNEL SAFETY SYSTEM OF ELI-ALPS

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Introduction

ELI-ALPS will be the first large-scale attosecond facility accessible to the international scientific community and its user groups. The facility-wide Personnel Safety System (PSS) has been successfully developed and commissioned for all the 10 laboratories of the non-ionizing area. It provides safe and automatic sensing and interlocking engineering measures as well as monitoring and controlling interfaces for all relevant laboratories. Furthermore it integrates and monitors the research technology equipment delivered with the prescribed interface by external parties as black-box systems and also the inhouse developed white box systems.





Architecture

Every laboratory has its own dedicated safety PLC, to which all the field devices located in the lab are connected (Fig. 5). The safety PLCs are connected to each other, forming a safety network (Fig. 6). Highly reliable industrial switches are installed next to every PLC for interconnecting them through a deterministic Ethernet network. The info panels also use these switches to connect to the PLCs. On this network, the PLCs can exchange information and spread interlock signals (fire alarm, facility level interlock) among each other

5. Laboratory Architecture







Interlocks

There are three types of interlocks: Facility Interlock (FI): Provided by the facility-wide PSS, on the basis of an alarm from an interconnected facility-wide safety system Laboratory Interlock (LI): Provided by the facility-wide PSS, on the basis of a signal from a safety device Equipment Interlock (EI): Provided by the equipment's internal PSS.





Access control

A Security Access Control System (Sec-ACS) was delivered together with the Building Infrastructure The Safety Access Control System (Saf-ACS) designed and developed to cover all laboratory areas in Building "A" together with a proper integration towards the Sec-ACS, as well as the PSS (Fig. 8)

8. Safety Access Control



Graphical User Interface

The PSS has an OPC UA interface towards the high-level control and monitoring software of the infrastructure.

The authorized employees (e.g. the Laser Safety Officer) have access to this



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10. High-level Monitoring GUI



information, but remote manipulation of the PSS is not possible as this is a one-way connection. The OPC UA interface is separated from the safety code in the PLC and programmed in such a way that it can not accept commands from the high level interface, just monitoring requests: there is a Detailed Monitoring GUI (Fig. 9) with logs and device level details, and there is a High-level Monitoring GUI (Fig. 10) just showing the states of the labs.

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