SPES (Selective Production of Exotic Species) is an Istituto Nazionale di Fisica Nucleare (INFN) project to develop a Radioactive Ion Beam (RIB) facility as an intermediate step toward EURISOL. The Laboratori Nazionali di Legnaro (LNL) was chosen as site for the facility due to the presence of the PIAVE-ALPI superconductive linac accelerator, which will be used as re-accelerator for the RIBs. The SPES project is based on the ISOL method with an UCx Direct Target and makes use of a proton driver of energy 40 MeV and current 200μA.

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Neutron-rich radioactive beams will be produced by Uranium fission at an expected fission rate in the target in the order of 10^{13} fission/s. The key feature of SPES is to provide high intensity and high-quality beams of neutron-rich nuclei to perform forefront research in nuclear structure, reaction dynamics and interdisciplinary fields.

The exotic isotopes will be re-accelerated at energies higher than 10 AMeV for mass region of A=130. The expected beam-on-target is on the order of 10^8 pps for ^132Sn, ^90Kr, and about 10^5 - 10^6 pps for ^134Sn, ^95Kr considering a total efficiency of 2% from the +1 source to the experimental target.

The Safety Control System

The safety control system have been designed using self-controlled devices and applying redundancy for achieving a PL c/Cat. 4 (EN/ISO 13849-1) and a SIL3 (EN/IEC 62061) safety level. It controls: (1) the high voltage, (2) the target complex heating, (3) the pneumatic chamber handling, and (4) the LASER systems.

Each system is powered using a series of contactors controlled by the safety modules and a PLC.

Surveillance and User Interface

The safety system surveillance is carry out by a PLC. Locally, the user is able to control and see the status of the system using a touch screen interface (Magelis XBTGT533).

Additionally, an EPICS IOC (Input Output Controller) implementing a home-made MODBUS-TCP driver was developed in order to interconnect the system to the Front End control system (based on EPICS). The IOC was implemented on a Linux PC using two Ethernet interfaces; one is used for the PLC communication (MODBUS-TCP) and the other one is used for the EPICS communication (Channel Access). On the other hand, the MODBUS-TCP driver was developed using the “StreamDevice” device support for EPICS.

A PLC is used to monitor the status of the system, to allow the user to power on/off each system (when possible) and to control the sequence of pre-established automatic operations.