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Instrumentation for the SPES Facility

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The SPES Radioactive Ion Beam facility at INFN-LNL is presently in the construction phase. The facility is based on the ISOL method with an UCx Direct Target able to sustain a power of 10 kW. The primary proton beam is provided by a high current Cyclotron accelerator with energy of 35-70 MeV and a beam current of up to 0.75 mA. Neutron-rich radioactive ions are produced by proton induced Uranium fission at an expected fission rate of the order of $1E13$ fissions per second. After ionization and selection the exotic isotopes are re-accelerated by the ALPI superconducting Linac at energies of 10 AMeV. 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 like medical, biological and material sciences.

New instrumentation is required for operation with unstable beams and needs to be implemented coherently with the relevant milestones of the facility. Non-reaccelerated beams will be used for beta decay studies aided by the state of the art setup planned to this purpose. Reaccelerated beams, making use of direct reactions, will exploit magnetic spectrometers coupled to gamma array. The Galileo gamma spectrometer is being implemented to this purpose. An early phase of Galileo is presently operating with stable beams, selected preliminary results will be presented. For the operation with the first reaccelerated beams the AGATA tracking array will be installed at Legnaro in conjunction with a variety of ancillary detectors. A superconducting solenoid is planned to be used in conjunction with an active target and a high resolution missing mass spectrometer is under study in order to allow simultaneous measurement of excitation and de-excitation energy. Some examples of physics opportunities will be discussed.

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