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The SPES Exotic Beam ISOL Facility: Status of the Project, Technical Challenges, Instrumentation, Scientific Program

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SPES (Selective Production of Exotic Species) is the INFN project aimed to build a facility for Nuclear Physics studies with Radioactive Ion Beam (RIB). The facility is under construction at the INFN Legnaro National Laboratories and it will provide mostly neutron-rich exotic beams originating by fission fragments produced by an intense proton beam on a direct UCx target. The RIB project is mainly related to the development of an ISOL facility for neutron-rich exotic beam production, by means of a quite intense proton beam (of the order of few hundreds of microA), which is sent on a direct and sliced UCx target, with the aim of producing up to 1013 fissions/s. The SPES project time schedule and perspectives will be presented, focusing on the main technological innovations and challenges foreseen. The expected SPES beam intensities, their quality and, eventually, their maximum energies (up to 11 MeV/A for A=130) will permit to perform forefront research in nuclear structure and nuclear dynamics, studying a region of the nuclear chart far from stability. This goal will be obtained coordinating the developments on the accelerator complex with those performed on the experimental apparatuses. Part of the instrumentation is already installed at the Legnaro National Laboratory and it is regularly upgraded. Some other efforts are devoted to the development of further instrumentation, very innovative and challenging, which is presently under development within international collaborations and will be available for the experimentation at SPES.

Several Letter of Intents have been submitted, containing proposals to study theoretical and experimental open questions in nuclear structure and dynamics, which represent up-to-date scientific themes of world wide interest.

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