

## » THE EUROPEAN PROJECT



### **SPES: NUCLEAR PHYSICS FROM STARS TO BIOMEDICINE AND NEW MATERIALS**

It will study atomic nuclei produced in the most advanced stages of the evolution of stars and, at the same time, produce radioisotopes for medicine. This is the dual goal of SPES (Selective Production of Exotic Species), the project currently under construction at the INFN National Laboratories in Legnaro. Another aspect of the project concerns the possibility to study the properties of new materials through irradiation with neutrons.

At the core of the project is a high-intensity cyclotron, a circular accelerator capable of producing and accelerating protons at the rate of ten million billion protons every second. Two proton beams will be extracted from the cyclotron, one dedicated to the study of nuclear astrophysics and the other for applications, in particular those in the medical field.

For nuclear physics, the most fascinating aspect of SPES is the ability to produce highly unstable nuclei, very different from those found on Earth. Most of our knowledge on the properties of nuclei has been gained through the study of existing stable nuclei. The SPES beams will provide a new perspective allowing the properties of nuclei to be understood in extreme conditions. At the same time, SPES will be used for the production of particular radionuclides for nuclear medicine; in this way it will be possible to produce radiopharmaceuticals of an experimental and innovative nature, useful for the diagnosis and treatment of heart disease and cancer.

Finally, among the innovative aspects of the project, the funding system is worthy of mention. For the operation of SPES, the funds that can be obtained from the production of radioisotopes for medical purposes will be crucial, an aspect which provides the project with a prospect of autonomy and continuity.

SPES is part of a larger European project, Eurisol, which today sees European nuclear physicists engaged in the implementation of three radioactive ion beam infrastructures. In addition to SPES, in France a similar machine, SPIRAL2, is under construction and at CERN, the existing ISOLDE equipment is in the process of being upgraded. These three machines will constitute a distributed European infrastructure, available to scientists of the old continent. ■