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The double Penning trap mass spectrometer PIERADE for DESIR/SPIRAL2

The DESIR (Désintégration, Excitation et Stockage d'Ions Radioactifs) hall is a part of the new extension of GANIL; the SPIRAL2 facility. This hall will be dedicated to the study of nuclear structure, astrophysics and weak interaction with low energy beams (30-60 keV). With the low-energy comes the advantage of working with good optical quality ion beams, allowing high-precision experiments. Various experimental apparatus will take place in the DESIR hall, divided into three main categories, β-decay spectroscopy, laser spectroscopy and mass spectrometry.

In the DESIR hall, ion beams coming from the upgraded SPIRAL1 facility and the Super Separator Spectrometer S3 will be available. SPIRAL1 is producing light exotic nuclei by ISOL-fragmentation and S3 a wide range of neutron deficient nuclei (including refractory elements) by in-flight fusion evaporation. SPIRAL1 and S3 will deliver unique ion beams to DESIR, but the production techniques are non-selective and, depending on the region of interest, can produce huge amounts of contaminants. To guarantee a high purity of the samples a HRS (High-Resolution Separator), composed mainly of two 90 degrees magnetic dipole and one multipole, is foreseen to be located in front of the DESIR hall. Its resolving power on the order of 10^4 will allow a purification of most isobars from the ion beam. Nevertheless, an even higher resolution is required to separate a few ions of interest from a large number of contaminants such as very close isobars or long-lived isomers.

For that purpose, at the entrance of the DESIR hall will be installed the GPIB (General Purpose Ion Buncher), a linear Paul trap for cooling and bunching continuous ion beam and the double Penning trap mass spectrometer PIPERADE (PIèges de PEnning pour les ions RAdionucléides à DESIR). The mass resolving power of PIPERADE is expected to be higher than 10^6 and will allow purification of close isobars and isomers. Besides purification purposes, PIPERADE will be used as a mass measurement apparatus on its own. The GPIB and PIPERADE are now fully assembled at CENBG and under commissioning before their transfer to GANIL in 2 or 3 years. Their status will be presented as well as recent achievements.

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