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PHYSICS AVENUE WITH THE SUPER SEPARATOR SPECTROMETER (S3) AT THE SPIRAL2 FACILITY

Tuesday 5 December 2017 09:00 (30 minutes)

The LINAG superconducting linear accelerator of the SPIRAL2 project in GANIL (Caen) will produce stable heavy ion beams with very high currents. Their energy ranges from from 2 to 14MeV/u. These stable ion beams will enable us to observe rare events in the fields of nuclear physics, like very heavy and superheavy elements studies, neutron deficient nuclei at the proton drip line, as well as of atomic physics, like beam-beam ion interactions. S3 (Super Separator Spectrometer [1]) is a device designed to handle these high beam currents, combining a high selectivity of the reaction products with a high transmission of the nuclei of interest. The primary target is a fast rotating wheel, able to sustain the high beam current. The S3 line is a two-step, low energy fragment separator. The first step is a momentum achromat for rough rejection of the primary beam and the second step is a mass spectrometer. The backbone of S3 is composed of seven large aperture (r=150mm) superconducting quadrupole triplets. They are combined with sextupole and octupole correctors, in order to ensure a high mass resolution at the final focal plane. It can be equipped with different detection setups. Notably, the SIRIUS [2] spectroscopy station is designed to study proton alpha, electron and gamma decays of the nuclei of interest. Conversely, the REGLIS3 [3] low energy branch can be installed to stop the products in a gas cell for in-gas-jet laser ionisation and spectroscopy and, if required, transmission to other detection systems. In the present contribution, we will present the design and the latest progresses in the construction of the spectrometer. We will show the expected performances for some highlight physics cases.

[1] F. Dechery al., Eur. Phys. J. A 51, 56 (2015).
[2]J. Piot and the S3 collaboration, Acta Phys. Pol. B 43, 285 (2012).
[3]R. Ferrer al., Nucl. Inst. and Meth. B 317, 570 (2013).

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