

## PhD position in accelerator physics

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### Heavy ions beam dynamics in the SPIRAL2 linac and in the S<sup>3</sup> separator

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The SPIRAL2 linear accelerator and its RFQ is optimized for light ions (protons, deuterons, helium), but it will also deliver heavier ions (O, Ne, Ar,...Ni) with great efficiency for the research topics of the S<sup>3</sup> spectrometer. The first objective of the PhD, is to propose and study the methods allowing to tune a heavy ion beam in 26 independent accelerating RF cavities in a fast and reproducible way up to S<sup>3</sup> (extrapolated tuning, energy dispersion control, study of a modification of high-energy lines).

The S<sup>3</sup> electromagnetic separator will use the beams from the linac to create and purify radioactive ions with a high efficiency. The complexity of its superconducting magnets requires an optimization of many parameters. Thanks to numerous hexapolar and octupolar corrections, we will be able to reduce the beam optical aberrations. The commissioning of the separator will require numerous measurements with beams and the development of an algorithm to optimize the optics for the 2 different operating modes (convergent mode for optimum transmission and dispersive mode for the measurement of the ratio M/ Q radioactive ions). The second objective is to provide the simulation tools to nuclear physicists allowing them to prepare their experiments at S<sup>3</sup> and to adjust the parameters of the spectrometers during the experiments. The thesis work will be based on beam dynamics simulations and experimental measurements with beams.

#### Expected skills:

good knowledge in accelerator physics, scientific computing (C++ ), math skills.

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