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SPIRAL2 - towards the high intensity frontier both for stable heavy ions and Radioactive Ion Beams

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The SPIRAL 2 facility [1], an ambitious extension of the GANIL accelerator complex, has entered recently in the construction phase. In the frame of this project, a new superconducting linear accelerator delivering high intensity, up to 40 MeV, light (proton, deuteron, 3-4He) beams as well as a large variety of heavy-ion beams with mass over charge ratio equal to 3 and energy up to 14.5 MeV/nucl. will be constructed. Using a dedicated converter and the 5 mA deuteron beam, a neutron-induced fission rate is expected to approach 1014 fissions/s for high-density UCx target. The versatility of the SPIRAL 2 driver accelerator will also allow using fusion-evaporation, deep-inelastic or transfer reactions in order to produce very high intensity Rare Isotope Beams and exotic targets. The energies of accelerated RIB will reach up to 7-8 MeV/nucl. for fission fragments and 20 MeV/nucl. for neutron-deficient nuclei.
The physics case of SPIRAL 2 based on the use of high intensity Radioactive Ion Beams and stable light- and heavy-ion beams as well as on possibilities to perform several experiments simultaneously will be discussed and illustrated with recent results obtained at GANIL/SPIRAL. In particular, it will be shown that a use of these beams at the low-energy ISOL facility (DESIR) and their acceleration to several MeV/nucl. as well as of high neutron flux at the n-tof like facility will open new possibilities in nuclear structure physics, nuclear astrophysics, reaction dynamics studies.
Relatively moderate intensities and high cost of radioactive beams impose a use of the most efficient and innovative detection systems as the magnetic spectrometer VAMOS, the 4P gamma-array EXOGAM and AGATA as well as charged particle detectors like MAYA, MUST 2 and TIARA. Several new concepts of the detection systems (ACTAR, DESIR, FAZIA, GASPARD, PARIS) and a new separator/spectrometer S3 located in dedicated experimental halls are currently under design. The existing detection systems and the experimental area will be adopted to take a full benefit of the high intensity (up to 1011pps) RIB.

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The Colloquium will be given in English

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