

SPIRAL2@GANIL: a world leading ISOL facility for the next decade

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To pursue the investigation of a new territory of nuclei with extreme N/Z called “terra incognita” several projects, all aiming at the increase by several orders of magnitude of the RIB intensities are now under design and/or construction worldwide. The main goal of SPIRAL2 is clearly to extend our knowledge of the **limit of existence and the structure of nuclei** deeply in the medium and heavy mass region ($A=60$ to 140) which is to day an almost unexplored continent.

SPIRAL 2 is based on a high power, CW, superconducting driver LINAC, delivering 5 mA of deuteron beams at 40MeV (200KW) directed on a C converter+ Uranium target and producing therefore more $5 \cdot 10^{13}$ fissions/s. The expected radioactive beams intensities for exotic species in the mass range from $A=60$ to $A=140$, of the order of 10^6 to 10^{10} pps **will surpass by two order of magnitude any existing facilities in the world. These unstable atoms will be available at energies between few KeV/n to 15 MeV/n.** The same driver will accelerate high intensity (100 μ A to 1 mA), heavier ions up to Ar at 14 MeV/n producing also proton rich exotic nuclei. Design of a second injector for heavier ions (from Kr to U, $A/Q=6-8$) is also under study. Several national and international partners are involved in the construction of the accelerator and the converter target-ion sources RIB systems.

In applied areas SPIRAL2 is considered as a powerful variable energy neutron source, a must to study the impact of nuclear fission and fusion on materials. The intensities of these unstable species are excellent opportunities for new tracers and diagnostics either for solid state, material or for radiobiological science and medicine. The “Go” decision has been taken in May 2005. The investments and personnel costs amount to 130 M€ for the construction period 2006-2012. Funding from EU 7th framework and from others partnership countries are expected to contribute for about 20% to this budget. The status of the construction will be outlined.

To shed light on the physics case, selected examples of new physics phenomena recently observed with the first generation of Radioactive Beam Facilities (RIB) in Europe will be discussed. Based on Letter of intents process, large international collaborations are proposing innovative new instrumentation and methods for the for SPIRAL2 facility. Scientific and technical R&D programs in collaboration with EU and International partners will be presented.

