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# Long-term research and development for the SPIRAL1 facility

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After 4 years of upgrade, the SPIRAL1 (Système de Production d'Ions Radioactifs Accélérés en Ligne) facility situated at GANIL (Grand Accélérateur National d'Ions Lourds) is again on-line. Its capabilities of hosting target ion-source systems using other ionization techniques than electron cyclotron resonance allows the extension of the production of radioactive ion beams (RIBs) to sticky chemical species. The in-target production variety will in the future be further enlarged owing to the panel of primary beams in terms of elements and energies, and to a new license authorizing other targets than graphite. The increased number of target-primary beam combinations gives the possibility to optimize the yields using the best reaction among fusion-evaporation, transfer or fragmentation. Optimized TISS must be developed to make the most of these new possibilities. The list of the most interesting RIBs for the nuclear community, which will guide the short and long-term R&D plan, will therefore have to be enriched taking into account these new possibilities. So far, the efforts have mainly been focusing on the nuclide chart region of "light isotopes"with masses lower than Nb for target fragmentation induced by carbon@ 95MeV/A beam, and of isotopes with masses up to U for beam fragmentation on graphite target. Neutron deficient isotopes ranging from A˜70 to ˜130 produced by fusion-evaporation reactions is our next objective. A new principle developed over the last 3 years aims at producing high yields of alkali elements by optimizing the atom-to-ion transformation efficiency within the TISS to balance low in-target productions. Parameters involved in the efficiency, i.e. target structure, stickiness, diffusion and effusion release, and thermal properties of materials are under study. Estimates give yields rarely obtained previously in this region, which is hard to explore at other facilities. If the principle of the first prototype is validated, the technical principle will be transposed to the production of neutron-deficient metallic isotopes within the next 3 years.
The status of these developments are presented.

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