

Production of neutron-rich fission fragments for the SPIRAL-2 project at GANIL: neutrons or photons?

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Abstract

The aim of the considerations below is to estimate the orders of magnitude for the production of RNBs at GANIL with possible evolutions of the present accelerator complex within the next 5 years. In this respect, the time scale considered is intermediate between long range plans such as Eurisol, a R&D programme that is just starting in a European collaboration, and the present SPIRAL facility, starting its operation recently. In this context we consider and compare methods to produce ISOL beams by fission with the main goal – to reach 10^{13} fissions/s in the RNB production target. Such RNBs would complement the present SPIRAL beams obtained by fragmentation of the projectile or the target, that are limited to light elements if high intensities are required.

Only two remaining options are quantitatively evaluated and presented, namely:

- a) fission induced by 14 MeV neutrons (from 40 MeV deuteron driver), and
- b) fission induced by bremsstrahlung photons (from 50 MeV electron driver).

The study includes not only predicted RNB intensities but also a preliminary facility layout description, costs, radioprotection issues, realisation time-scale, etc. Different options for a postacceleration of the neutron-rich fission fragments is also discussed.

References

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