

Neutron deficient exotic nuclei and the Physics of the "proton rich side" of the nuclear chart



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Fundamental research using the high intensity proton beams of MYRRHA at SCK•CEN

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Since 1995, SCK•CEN has been studying the coupling of a proton accelerator, a liquid Lead-Bismuth spallation target and a Lead-Bismuth cooled, sub-critical fast reactor core. The project, since 1998 named MYRRHA, has evolved to a larger installation, able to work in subcritical mode (as an Accelerator Driven System) and in critical mode.

Apart from the experimental and irradiation possibilities in the subcritical reactor, the MYRRHA proton accelerator on its own can be used as a supply of proton beams for a number of experiments. In order to explore new research opportunities offered by the accelerator, a pre-study was carried out within the framework of the "Belgian Research Initiative on eXotic nuclei" (BriX) network of the Interuniversity Attraction Poles Programme of the Belgian State. This study was investigating unique possibilities for fundamental research using high-intensity proton beams with a fraction of the full beam during ADS operation (up to 200 μA).

An interesting approach for fundamental research using the 600-MeV proton accelerator is the installation of an Isotope Separator On-Line (ISOL@MYRRHA) facility with a ruggedized target-ion source system, which is able to provide intense low-energy Radioactive Ion Beams (RIB) for experiments requiring very long beam times (up to several months). This opens unique opportunities for RIB research in various scientific fields, which is complementary with the activities at other existing and future facilities.

MYRRHA is foreseen to be in full operation by 2024 and it will be operated in the first years as an ADS. In a second phase, when the MYRRHA reactor will run as a stand-alone critical reactor, the full proton-beam intensity might be used for ISOL@MYRRHA or other applications.

This presentation will introduce the MYRRHA and ISOL@MYRRHA facilities, the physics that can be uniquely addressed at ISOL@MYRRHA, the present status of the project and future plans.

Summary

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