

Realisation of a New Research Infrastructure in Belgium:

MYRRHA

Status and Physics opportunities in MYRRHA and ISOL@MYRRHA

Hamid Aït Abderrahim,

SCK•CEN/MYRRHA

Boeretang 200, BE-2400, Mol, Belgium

haitabde@sckcen.be or myrrha@sckcen.be

Abstract

Since 1998 SCK•CEN is developing the MYRRHA project as an accelerator driven system based on the lead-bismuth eutectic as a coolant of the reactor and a material for its spallation target. The nominal design power of the MYRRHA reactor is 100 MWth. It is driven in sub-critical mode ($k_{eff} = 0.95$) by a high power proton accelerator based on LINAC technology delivering a proton beam in Continuous Wave (CW) mode of 600 MeV proton energy and 4 mA intensity. The choice of LINAC technology is dictated by the unprecedented reliability level required by the ADS application. In the MYRRHA requirements the proton beam delivery should be guaranteed with a number of beam trips lasting more than 3 seconds limited to maximum 10 for a period of 3 months corresponding to the operating cycle of the MYRRHA facility. Since 2015, SCK•CEN and Belgium government decided to implement the MYRRHA facility in three phases to minimize the technical risks associated to the needed accelerator reliability.

MYRRHA is conceived as a flexible fast-spectrum pool-type research irradiation facility cooled by Lead Bismuth Eutectic (LBE), and was identified by SNETP (www.snetp.eu) as the European Technology Pilot Plant for the Lead-cooled Fast Reactor. MYRRHA is proposed to the international community of nuclear energy and nuclear physics as a pan-European large research infrastructure to serve as a multipurpose fast spectrum irradiation facility for various fields of research such as; transmutation of High Level Waste (HLW), material and fuel research for Gen.IV reactors, material for fusion energy, innovative radioisotopes development and production and for fundamental physics. As such MYRRHA is since 2010 on the high priority list of the ESFRI roadmap (<https://www.esfri.eu/>).

On September 7, 2018 the Belgian federal government decided to build this large research infrastructure. In this lecture we will summarize the status of the project today and we will stress the vision on how this large research infrastructure can serve the research community in Belgium and Europe and more particularly the physics opportunities thanks to ISOL@MYRRHA.