

<u>MYRRHA an Accelerator Driven System Based</u> <u>on LFR Technology</u>

Summary / Objectives:

SCK•CEN is actively working on designing and building a new multifunctional research installation: MYRRHA as in Multi-purpose hYbrid Research Reactor for High-tech Applications. This webinar will present the MYRRHA project, an accelerator driven system coupling a sub-critical Pb-Bi cooled reactor and a high power proton accelerator through a spallation target which is the very first prototype of a nuclear reactor driven by a particle accelerator in the world. As an external source of neutrons, this particle accelerator maintains the nuclear fission chain reaction. It is referred to as a subcritical reactor: the core does not contain enough fissile material to spontaneously maintain the chain reaction. This innovative nuclear technology is safe and easy to control. When the particle accelerator is stopped, the chain reaction also stops automatically within a fraction of a second.

Meet the Presenter:

Dr. Hamid Aït Abderrahim is both the Deputy Director General of SCK•CEN, the Belgian nuclear research center, and a professor of reactor physics and nuclear engineering at the "Université Catholique de Louvain" at the Mechanical Engineering Department of the "Ecole Polytechnique de Louvain". Since 1998, he has been the director of the MYRRHA project. He is a partner and/or coordinator of various projects of the European Commission framework programme related



to advanced nuclear systems or to partitioning and transmutation of HLW management. From September 2007 to December 2011, he chaired the Strategic Research Agenda working group of the SNETP and has been the chairman of the Governing Board of SNETP since 2015. He represents Belgium in the Governing Board of the project JHR.



Introduction of an Accelerator driven system (ADS):

The ADS is simply reactor. This system is need an external source of neutrons that source is produce to a linear accelerator into the center of core on heavy metals. These heavy metals are led, bismuth, tungsten, tantalum etc.



Transmutation impact:

The time scale needed for the radiotoxicity of the waste to drop to the level of natural uranium will be reduced from a 'geological' value (300,000 years) to a value that is comparable to that of human activities (several hundreds of years).





Introduction of the MYRRHA project:

The MYRRHA is an ADS, but the operate mode has critical and sub-critical mode. The neutron source in sub-critical mode is created by shooting a proton beam of 600 MeV at maximum on a led-bismuth target in the center core.



MYRRHA Core and Fuel Overview:

The MYRRHA core has the hexagonal fuel assemblies with MOX fuel, the control rods etc. The central place in the core is the beam tube with spallation target.

MYRRHA Project strategy:

The phase 1 is the accelerator with two injectors until 100MeV. The phase 2 is upgrade the accelerator to 600MeV, and the phase 3 is construct the reactor.

MYRRHA Project Plan:

The accelerators and targets for regular isotope for phase 1 will be built by 2022. And we take the decision by 2024 to upgrading the accelerator to 600MeV of phase 2 and constructing the reactor of phase 3.

