Contribution ID: **231** Type: **Invited Lecture**

INVITED LECTURE - Conceptual design of a low power ADS with a 70 MeV proton beam for reasearch and training

Tuesday 18 September 2012 16:50 (20 minutes)

In the framework of research on generation IV reactors, it is very important to have the opportunity of using infrastructures specifically dedicated to the study of fundamental parameters in kinetics and/or dynamics of future, fast-neutron based, reactors, a capability not available for presently available zero-power prototypes.

We propose the conceptual design of an ADS with high safety standards, to be used as well as a training facility, but also good flexibility to allow for an wide range of measurements: safety is guaranteed by limiting both the power of the system to be less than 500 kW and the neutron multiplication coefficient to be around 0.95, by using plutonium-free fuel and diffusion by a solid lead matrix.
Lead has been chosen by considering this prototype to be a useful step towards the design of future LFR, as well as because it allows a harder neutron spectrum, to facilitating tests on actinides fission, as well

The system is intrinsically subcritical and it needs an external neutron source to be sustained.
Specific target of the conceptual design is to optimize design features of the core in such a way to meet previous requirements with the use of commercially available accelerator to reduce design costs and increase reliability.

The conceptual design considers 88 active elements made by a solid lead matrix of dimensions 92X92X1200 mm., each containing 81 uranium oxide fuel rods, enriched at 20% of U235. Protons, coming from a continuous cyclotron of 70 MeV in energy and 1 mA in beam current, are converted into neutrons by a beryllium target. Cooling is provided by helium gas, transparent to neutron and not subject to activation.

Author: Dr SARACCO, Paolo Giovanni (Istituto Nazionale di Fisica Nucleare, Sez. Genova, Italy)

Presenter: Dr SARACCO, Paolo Giovanni (Istituto Nazionale di Fisica Nucleare, Sez. Genova, Italy)

Session Classification: Session 6 (cn't of Session 5) - Nuclear fuel cycles, Research Reactors and present NPP (including Gen IV and Th reactors)

Track Classification: Nuclear fuel cycles, present Gen III+ NPPs, Gen IV and Th based reactors