

## INNOVATIVE REACTORS-ACCELERATOR DRIVEN SYSTEM

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The renaissance of Nuclear Energy in the beginning of XXI century is bringing new initiatives in the word such as GIF (Generation IV initiative), and INPRO (International Project on Innovative Nuclear Reactors and Fuel Cycle). These new initiatives are looking for new innovative reactor concepts and associated fuel cycles which take as principle the sustainability of the Nuclear Energy for the next centuries. Among several concepts being considered, Fast Spectrum System is the focus of this research group, in particular Accelerator Driven Systems (ADS) as a dedicated waste burner reactor, mainly transuranics (Plutonium and minor actinides) in a double strata fuel cycle using thorium. The activities under way are mainly related with calculation methodologies implementation and fuel cycle simulations. Although, the activities are beginning, the participation in the International Atomic Energy Agency (IAEA) technical working group in fast system (TWG-FR) is being an opportunity to be in contact with the international status of the art on the research topic.

The main activities and resulted products during 2002-2003 in innovative systems were:

1. Participation in the technical meetings to Review of National Programmes on Fast Reactors and Accelerator Driven Systems(ADS) of the TWG-FR with presentation of the national report, in 2002 ( Karlsruhe, Germany), and 2003 ( Daejeon, Republic of Korea);
2. Conclusion of a Ph.D thesis presented at IPEN-USP (2002): S. Anéfalos;
3. The activities related to the Conceptual Integral Lead Fast Reactor were published in Nuclear Technology, and presented at GLOBAL 2003;
4. A proposal of a program on accelerator utilization for basic and applied R&D, products and services, and to drive a low power research reactor ADS were made together with IFUSP. Besides a document sent to the governmental institutions, papers were presented at the V Latin American Symposium on Nuclear Physics (2003), in the Brazilian Meeting on Nuclear Physics (2002), and a paper containing the proposal was published at the Brazilian Journal of Physics (2003) . Also, the Brazilian Status on ADS R&D were presented at ADOPT 2003 held at SCK-CEN, Belgium, and a paper to PHYSOR 2004 was accepted for publication;

5. International contacts were established through a scientific visit supported by an IAEA TC Project (BRA/0/018-92-03). This visit included the participation in International Workshop on P&T and ADS Development (ADOPT 2003), and meetings with CEA-France personal in Paris Headquarters and in Cadarache to discuss topics of a bi lateral agreement between CEA and CNEN, including potential cooperation in ADS. Also a visit to MAZURCA facility (MUSE ) was realized. The participation in the IAEA Workshop on Technology and Applications of ADS, held at ICTP, Trieste, Italy, October 2003, and a Technical Meeting on Review of Solid and Mobile Fuels for Partition and Transmutation Systems, hosted by CIEMAT, Spain, in December, 2003 were also activities performed;

6. The development of a Multi Collision Monte Carlo Code for intra nuclear cascade and evaporation-fission calculation in development by the Physics Institute of São Paulo University (IFUSP) is being benchmarked;

7. Recently, two new academic researches were initiated with support of FAPESP. The first is a Ph.D thesis, titled Development of Calculation Methodology for ADS burn up and transmutation ,and the second a transmutation study on utilization of thorium in a double strata fuel cycle with ADS. As concluding remarks, we notice that although the activities in development are academics and just in the beginning, in the last years (2002-2003) there was significant progress.