



**The 2-nd International Conference**

**Current Problems in**

**Nuclear Physics and Atomic Energy**

**June 9 - 15, 2008**

**Book of Abstracts**



**Kyiv, Ukraine**



RESULTS OF FIRST EXPERIMENTS ON NEUTRON GENERATION  
IN THE VITA NEUTRON SOURCE

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Pilot innovative facility for neutron capture therapy was built at Budker Institute of Nuclear Physics, Novosibirsk. This facility is based on a compact vacuum insulation tandem accelerator (VITA) which is designed to produce proton current up to 10 mA. Epithermal neutrons are proposed to be generated by 1,915 MeV protons bombarding a lithium target using  ${}^7\text{Li}(p, n){}^7\text{Be}$  threshold reaction.

Experiments on neutron generation have been started in the March of 2008. Gamma-ray spectrometer based on NaI scintillator was used for measuring gamma rays emitted by lithium under the action of protons, and by other nuclei under the action of neutrons. The gamma-ray spectrometer was calibrated by radioactive sources  ${}^{60}\text{Co}$ ,  ${}^{137}\text{Cs}$ ,  ${}^7\text{Be}$  and  ${}^{40}\text{K}$ . This spectrometer was used as activation detector due to capture of epithermal neutrons by iodine also. Bubble detectors were used for fast and thermal neutrons registration. Total yield of neutrons was defined by  ${}^7\text{Be}$  activity. Simulation of flux and spectrum of both gamma-ray and neutrons at 50  $\mu\text{m}$  lithium thickness and 1.915 MeV proton beam were performed by means of PRIZMA code. Calculation of speed of detector activation had been carried out. In the report the results of the first experiments on neutron generation and results of simulations are reported and discussed. Prospect of accelerator based facility and near threshold regime of neutron generation for boron neutron capture therapy had been confirmed by current experiment. The immediate plans of target improvement and using of time-of-flight technique for neutron spectra measurement are declared.

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## THE SPECTROMETRIC INSTRUMENTS FOR NPP RADIATION SAFETY MONITORING

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The ultimate goal of the NPP radiation monitoring is to provide the personnel and the population with the information on possible threat. This is information on the safety barriers integrity and some other issues relating the nuclear energy production safety:

- The ensuring of the nuclear energy utilization safety needs early warning on the emergency possibility. The presence of certain radio nuclides in the NPP technological medium is used as such an indicator. All this relates to the safety barriers integrity monitoring.
- The RadWaste management needs waste characterization before the disposal or long-term storage.
- Spent fuel management needs information on fuel rods' integrity and the assembly's' burnup.
- The radioactivity level in the human body and the environment is the final indicator of the nuclear energy utilization safety.

During almost two decades RPE «ATOMKOMPLEXPYRLAD» produces spectrometry instrumentation, which supports solving most of these problems. Basing on national and international safety standards and gained experience we formulated tasks of radiation safety monitoring, compared them with our possibilities and determined gaps in monitoring.

The report presents systematic approach to NPP radiation monitoring and proposals for its' further upgrading.

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