Contribution ID: **117** Type: **Oral**

Comparison of experimental and calculated neutron flux in Co-59 at the spallation target QUINTA

Monday, 31 August 2015 15:30 (15 minutes)

One of the most important parameter of ADS experimental setups is a neutron flux density of the secondary neutron field. The flux can be experimentally determined using activation detectors like Co-59. The experiment with Co-59 was performed at Joint Institute for Nuclear Research, Dubna, Russia in December 2013. The field of secondary neutrons was generated at the massive natural uranium spallation target "QUINTA". The QUINTA assembly was irradiated with deuteron and carbon beams at the Nuclotron accelerator. Energy of particles was 4 AGeV for deuteron beam and 2 AGeV for C-12. The samples of Co-59 were irradiated in the field of secondary neutrons. Samples were square-shaped. A total of 10 experimental samples were situated in different positions inside the target QUINTA. The setup is composed of five hexagonal sections. The total mass of natural uranium is 512 kg. The uranium is situated in aluminium rods. After irradiation, the samples were transported to the YaSNAPP spectroscopy laboratory. In the laboratory, the samples were measured with the use of HPGe semiconductor detectors. Reaction rates were determined for residual nuclei in cobalt samples. Reaction rates from deuteron beam irradiation were compared with reaction rates from C-12 beam irradiation. Experimental values were also compared with calculated values using the MCNPX and TALYS 1.6 codes. The neutron flux was determined using the experimental results of (n,xn) and (n,p) reactions. The experimentally determined neutron flux was compared with simulations. The comparisons have a good agreement.

Primary author: ZEMAN, Miroslav (Brno University of Technology/ Joint Institute for Nuclear Reserch)

Co-authors: Dr SOLNYSHKIN, Alexandr (Joint Institute for Nuclear Research); Dr BALDIN, Anton (Joint Institute for Nuclear Research); Dr ADAM, Jindrich (Joint Institute for Nuclear Research/ Nuclear Physics Institute ASCR); Ms VRZALOVA, Jitka (Czech Technical University in Prague/ Nuclear Physics Institute ASCR/ Joint Institute for Nuclear Research); Mr KHUSHVAKTOV, Jurabek (Joint Institute for Nuclear Research); Dr KATOVSKY, Karel (Brno University of Technology); Mr ZAVORKA, Lukas (Czech Technical University in Prague/ Joint Institute for Nuclear Research); Mr SUCHOPAR, Martin (Czech Technical University in Prague/ Nuclear Physics Institute ASCR); Dr ZHIVKOV, Petar (Institute of Nuclear Research and Nuclear Energy of Bulgarian Academy of Sciences); Mr CHUDOBA, Petr (Czech Technical University in Prague/ Nuclear Physics Institute ASCR); Mr VESPALEC, Radek (Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering / Joint Institute for Nuclear Research, Dzhelepov Laboratory of Nuclear Problems); Dr TYUTYUNIKOV, Sergej (Joint Institute for Nuclear Research); Dr WAGNER, Vladimir (Czech Technical University in Prague/ Nuclear Physics Institute ASCR); Prof. TSOUPKO-SITNIKOV, Vsevolod (Joint Institute for Nuclear Research); Dr FURMAN, Walter (Joint Institute for Nuclear Research); Mr KISH, Yurij (Uzhgorod National University/ Joint Institute for Nuclear Research)

Presenter: ZEMAN, Miroslav (Brno University of Technology/ Joint Institute for Nuclear Reserch)

Session Classification: Accelerators and Instrumentation I