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## Seminarium Zakładu Energetyki Jądrowej i Analiz Środowiska (UZ3) Departament Badań Układów Złożonych (DUZ)

Wtorek: **08.03.2022**  
**11:30**

**dr hab. inż. Marcin Szuta, prof. NCBJ**

### **Minor actinides incineration efficiency in ADS**

#### **Abstract:**

The presentation includes the results of investigations of nuclear-physical characteristics of neutron fields generated in a massive uranium target irradiated by deuterons with an energy of 4.0 GeV. 23 natural uranium samples spatially arranged in a sub-critical assembly Quinta (at the Joint Institute for Nuclear Research, Dubna, Russia), were irradiated with spallation neutrons. We have processed the experimental data based on gamma-ray spectrometry in order to reach (obtain) the number of neutron-induced fissions and neutron captures in the detector foils. Applying the try and error method we have found that the neutron energy for which the ratio of the fission cross section to the capture cross section of the natural uranium from the nuclear database is equal to the measured ratio of the spectral indexes. The retrieved distinct fission and capture cross sections for the distinct neutron energy from the nuclear database describe the average values which enabled us to evaluate the average neutron flux and neutron fluency distribution in the assembly.

After embracing the experimental data and combining them we can suggest that the deuteron beam energy of 2 GeV controlling the subcritical assembly Quinta (ADS) in terms of efficiency incineration and the economic view is the best one for incineration the MA.

Inside the structure of fuel, the average neutron flux can be very close to the average energy of fission neutrons which ensure that the incineration efficiency is within the range of 8 – 27 times higher for Np-237 and 4 - 23 times higher for Am-241 than the production of next actinides.

Having the distribution of the average neutron energy and the average neutron flux density along the length of the Quinta set for a deuteron beam with an energy of 4 GeV, we first determine the distribution of cross-sections for fission and capture, e.g.Np-237 and then determine the distribution of the incineration rate of the neptunium in the Quinta set (using the database ENDF/B-VII.1.).

Serdecznie zapraszamy  
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