



DOCTORAL RESEARCH TOPIC:

Neutron transport and radioactive processes analysis in particle accelerators and neutron source systems

RESEARCH FIELD:

Energetics and Power Engineering (T 006)

BRIEF DESCRIPTION OF RESEARCH TOPIC:

In recent years, the search for safer energy sources were globally intensified and therefore require more and more research is related to the future of energy, which is strongly linked to the fusion energy.

Fusion devices with burning plasma generates high energy neutrons which can affect the radiation-sensitive components, so a detailed study of the neutron transport is considered a major challenge in the design and operation of fusion devices. In order to investigate such high-energy neutron interactions with the material, particle accelerators and neutron sources are under construction or design in many different countries in all over the world. No less important is the description of the beam target irradiation itself.

The main goal of the research is to evaluate neutron irradiation effects on constructional and functional materials and estimate radiological impact to the particle accelerator target system.

One of the tasks to be performed during PHD period is related to neutron transport and flux distribution calculations for particle accelerator target system by means of 3D Monte Carlo particle transport simulations with recommended code MCNP6, which is widely benchmarked and validated for fusion and particle accelerator neutronics applications, using variety of nuclear cross-section data libraries, the specified DONES and CERN n_TOF neutron source and the geometry model.

In addition, the second main task will be the complete analysis, MCNP6, which will be used coupled with FISPACT II and dosimetry library TENDL2019 to evaluate activation, dose rate and decay heat with dominant nuclides in sample constructional and functional materials of particle accelerators.

SCIENTIFIC SUPERVISOR:

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