Seminarium Szkoły Doktorskiej NCBJ

Thursday, 9 December, 9:00
https://www.gotomeet.me/NCBJmeetings/phd-seminar

Speaker:

Michał Jędrzejczyk (Szkoła Doktorska NCBJ)

Title:

Applying Approximate Bayesian Computation to reduce nuclear data uncertainties

Abstract:

The multiplication factor (keff) is a key parameter describing the dynamics of nuclear reactors. The uncertainty in its calculated value usually amounts to 1-2 %, measured in one relative standard deviation. It mostly originates from the imprecision with which neutron cross sections are known. 1 % in keff uncertainty is a lot. Reduction of this value would open a possibility to create more optimal nuclear reactor designs. There is a large database of well documented criticality benchmark experiments with precisely measured keff. It is called "International Handbook of Evaluated Criticality Safety Benchmark Experiments" and it is maintained by Nuclear Energy Agency. The goal of my research is to use the results of these experiments to decrease the uncertainties of neutron cross sections. In order to do that I will use a statistical tool called Approximate Bayesian Computation (ABC) and a criticality simulation software SCALE.

In this seminar, I will discuss neutron cross section uncertainties and other nuclear data deficiencies. I will give an introduction to ABC and present a simple example of how it can be used to reduce uncertainties of any mathematical model parameters. I will then show how I am going to apply it to reduce neutron cross sections' uncertainties (which are parameters in keff calculations). Finally, I will discuss to what extent we can reduce calculated keff uncertainties this way.