

Benchmarking fission rate simulations through comparison with neutron activation data

Master work in applied nuclear physics, 20 weeks with 30 credits
(also could be a course project with 15 credits in 10 weeks)

1. Introduction

An experiment of neutron-induced fission was conducted in 2016. In this experiment some foils were implemented that were activated by the neutrons. By measuring the gamma activity of these using a High Purity Germanium (HPGe) detector we hope to be able to derive the neutron flux.

In order to study neutron-induced fission, a GEANT4 model of the experiment in 2016 has been developed. We would like to benchmark the fission rate from the simulation using the gamma data from the foils. The fission rate can be calculated from the neutron flux and fission cross section. The fission cross section is well known but we need to benchmark the neutron flux.

From the simulation one can calculate the number of gamma rays that should be emitted from the foils for a certain neutron flux. This can then be compared to the number of gamma rays that are obtained from measurement of the foils.

2. Assignment

Analysing the foil data, including extracting counts of gamma rays, as well as uncertainties. Calculating the activation rate from the assumed neutron flux.

3. Requirements

Basic nuclear physics. Experience in laboratory of nuclear physics.
Communication in English

Start date

As soon as possible, upon agreement

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