

To investigate the fission products in an electric field using GEANT4

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

In order to measure fission yield of neutron-induced fission, we have developed an ion guide in which the fission products are collected. In addition, a GEANT4 model has been constructed to simulate the fission products in the ion guide. Fission products are generated isotopically in neutron-induced fissions. When fission products are thermalized by the helium gas in the ion guide, the charge states of most products are changed to 1+. However, stopping efficiency of the Helium gas is presently not sufficient. One solution to this would be to use a larger stopping volume but this would require static and radio frequent electric fields to guide the fission products.

Before adding electric fields in the GEANT4 model, we want to know how the charged particles behaviour in an electric field and how to design an electric field to confine and drive the ions.

A literature study of the GEANT4 manual will be necessary to learn how static and oscillating electric fields are implemented in GEANT4. The second step is to test this in a simple model of the ion guide to optimize the collection and transportation of fission products

2. Assignment

Build a simple GENAT4 model including electric fields and investigate ion trajectories in these fields. Design an electric field to guide the ions.

3. Guidance

<http://geant4userdoc.web.cern.ch/geant4userdoc/UsersGuides/ForApplicationDeveloper/fo/BookForApplicationDevelopers.pdf>

4. Requirements

Basic knowledge of C++ and nuclear physics. Communication in English.

Start date

As soon as possible, upon agreement

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