

Diploma work in Applied Nuclear Physics

“Virtual studies of Nuclear Fission”

Bachelor Degree Project (Kandidat-exjobb)

Applied Nuclear Physics 15 credits (10 weeks)

Nuclear fission is an excellent topic for understanding the physics of nuclear matter. The interplay between the fundamental forces of nature gives rise to extraordinary phenomena and reveals details about how nuclei are formed as well about their internal structure. Fission models however, do fail in portraying a complete picture of the fission process. It is up to date, simply too difficult to solve the many-body interaction problem for all involved nucleons (fully microscopic) and therefore one must use macroscopic (or semi-microscopic) approaches. This is true especially if one aims at reproducing experimental data.

In this project work, we dive together into the fascinating world of splitting nuclei and find out how physical observables can be studied to reveal hidden systematics in the fission process. You will get the opportunity to use the leading available fission code (GEF) and to extract physical insights from it. We will study several parameters such as fission mass and charge yields, kinetic energies, angular momenta, neutron and gamma multiplicities and spectra. All the small puzzle-parts are collected to form a coherent image of the fission process. You will learn about nuclear fission by performing virtual experiments, utilizing the Monte Carlo method.

One project goal is to examine the various options of GEF; i. e. proton-induced fission, neutron-induced fission and spontaneous fission and to compare results from all reaction channels. Differences between the channels can be based on real physical grounds but could also be a flaw in the adapted fission model. The project may therefore result in constructive feedback to the developer of the GEF code. In addition, a possible scientific publication could be an outcome of the work.

Start date

As soon as possible, upon agreement.

Supervision

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