



Internship in experimental nuclear physics

Study of the transmission of the VAMOS Spectrometer for Fission Yields calculations

The fission process is a violent reaction in which a heavy nucleus is splitted in two components, the fission fragments. The distribution of the produced fission fragments is very large, more than 300 different isotopes are produced in fission and the relative production between them reveals the mechanism behind the process. This mechanism is strongly determined by the nuclear structure along with the nuclear dynamics that drives the system from an initial state to the final split through different states of deformation.

The complete identification of the fission fragments and their production is a crucial point in order to understand the phenomenon. The VAMOS magnetic spectrometer offers a great opportunity because of its large acceptance and its identification capabilities, fragments from $Z \sim 30$ up to $Z \sim 65$ and $A \sim 70$ up to $A \sim 160$ are accepted and identified. The goal of this Master Internship is to develop realistic calculations of the transmission of fission fragments through the VAMOS spectrometer in order to precisely determine the fission-fragments yields from real experimental data. For this task, the candidate will combine experimental data with realistic simulations from machine learning in order to improve the prediction of key observables such as the charge states distribution of heavy ions at Coulomb energies when they pass through matter such as the windows of detectors, and how these charge states affect the propagation through the ion optics of the spectrometer for the different ions.

The intern will become familiar with the most recent analysis tools and experimental techniques used in the experimental nuclear physics field.

Expected skills

Programming skills and prior knowledge of C++ and Python will be required. Previous knowledge on the ROOT framework would be desirable.

This work leads to a [PhD-thesis](#)

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