Alpha-decay of super-heavy elements: handling very low statistics

Erasmus-Mundus Internship
Nuclear physics and data analysis

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Only a handful of the heaviest elements were synthesized. There were identified by their alpha decay chains. In particular, the half-life is one of the observables that is used for the Z identification through the Geiger-Nuttall formula.

What the uncertainty in the half-life when only few events were detected? What is the reliability of the Geiger-Nuttal formula? Is it accurate enough to determine the Z number?

The goal of the internship is to use state-of-the-art statistical methods to answer to the previous questions: Bayesian statistics to evaluate the uncertainty in the half-life and modern regression methods such as bootstraps to assess the various Geiger-Nuttal formulas.

Once this preliminary work is achieved, the ultimate goal of the internship is to estimate the probability that the expected element was synthesized considering the whole decay chain.

Request skills: computering