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Study of nuclear fission through Isotopic Yields of Fission Fragments

The study of nuclear fission [1] plays a crucial role in understanding the fundamental aspects of nuclear physics and holds significant applications across various fields, including power production, space exploration, and the synthesis of radioisotopes for medical applications. In the ongoing fission campaign at the VAMOS++ facility [2], located at GANIL, we investigate the phenomenon of nuclear fission using inverse kinematics [3], which provides a kinematic boost resulting in higher kinetic energies of fission fragments compared to normal kinematics. By utilizing VAMOS++, we have successfully measured and characterized the isotopic distributions of fission fragments resulting from fusion- and transfer-induced fission reactions [4]. In addition to these distributions, the relative isotopic yields of fission fragments [5] provide crucial insights into the dynamics and mechanisms underlying the fission process.

During the AGATA campaign in 2016, we conducted experiments focusing on the fission of 247Cm using the 238U+9Be reaction at an incident energy of 6.2 MeV/A [3]. Additionally, the same reaction was investigated with the PARIS Setup in 2022 at an incident energy of 5.8 MeV/A. These two measurements led to the population of 247Cm at excitation energies of 46.8 and 43.3 MeV, respectively. By extracting isotopic fission yields from these experimental data sets, we aim to obtain valuable information regarding the influence of excitation energy and structural effects on the yields of fission fragments. Furthermore, by comparing these results with the isotopic fission-fragment yields obtained from the 238U+12C (Eb = 6.1 MeV/u) reaction [4], we aim to gain a broader understanding of the intricate details of nuclear fission. The ongoing analysis focused on achieving these objectives, is currently in progress, and we will present the results during the upcoming Colloque GANIL 2023.

References

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