Contribution ID: **120** Type: **Invited Oral**

Advancements of γ-ray spectroscopy of isotopically identified fission fragments with AGATA and VAMOS++

Thursday, 20 July 2023 11:35 (25 minutes)

The utilization of nuclear fission as a method to investigate the nuclear structure properties has been widely employed for several decades. This approach offers an effective means of producing neutron-rich exotic nuclei, covering a broad region of the nuclear chart. By studying the properties of fission fragments, a diverse range of phenomena, including shell closure effects, collective excitation, and shape coexistence, can be explored. The γ-ray spectroscopy of fission fragments is a very powerful method to probe the evolution of nuclear structure properties as a function of excitation energy, angular momentum and neutron-proton asymmetry [1-3].

However, the multitude of isotopes produced during the nuclear fission process also presents a significant challenge. Identifying a specific γ-ray transition originating to a particular nucleus among all γ-rays emitted by hundreds of fission fragments produced in a single experiment is a non-trivial task. Typically, two approaches are employed to address this challenge. The first one consists in utilizing a combination of known characteristic γ-rays from the fragment of interest or its complementary partner, along with high-fold γ-ray coincidence techniques [2, 3]. The second approach consists in using an experimental setup capable of detecting and isotopically identifying the fission fragments, thereby overcoming the requirement for knowledge of characteristic γ-rays [4, 5].

During the recent AGATA campaign at GANIL, a rich amount of fission studies experiments have been performed using the combination of the large acceptance VAMOS++ spectrometer and the state of the art γ-ray tracking array AGATA. This presentation aims to provide an overview of these experiments, highlighting selected results such as prompt and delayed γ-ray spectroscopy and short lifetime measurements of excited states.

[1] S. Leoni, C. Michelagnoli, and J. N.e Wilson. Gamma-ray spectroscopy of fission fragments with state-of-the-art techniques. La Rivista del Nuovo Cimento, 45(7) :461–547, July 2022.
[2] I Ahmad and W R Phillips. Gamma rays from fission fragments. Rep. Prog. Phys., 58(11) :1415–1463, nov 1995.
[3] J.H. Hamilton et al. New insights from studies of spontaneous fission with large detector arrays. Prog. Part. Nucl. Phys., 35 :635–704, 1995.
[4] M. Rejmund et al. Nucl. Inst. Methods Phys. Res. A, 646(1) :184–191, aug 2011.
[5] G. Montagnoli et al. The large-area micro-channel plate entrance detector of the heavy-ion magnetic spectrometer prisma. Nucl. Instrum. Methods Phys. Res. A, 547(2) :455–463, 2005.

Primary authors: DUDOUET, Jérémie (Univ. Lyon, Université Lyon 1, CNRS/IN2P3, IPN-Lyon, F-69622, Villeurbanne, France); LEMASSON, Antoine (GANIL, CEA/DRF-CNRS/IN2P3, BP 55027, 14076 Caen cedex 5, France); REJMUND, Maurycy (GANIL, CEA/DRF-CNRS/IN2P3, BP 55027, 14076 Caen cedex 5, France)

Presenter: DUDOUET, Jérémie (Univ. Lyon, Université Lyon 1, CNRS/IN2P3, IPN-Lyon, F-69622, Villeurbanne, France)

Session Classification: Session 11

Track Classification: Experimental Nuclear Structure