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Total gamma-ray energy in 252Cf spontaneous fission

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Prompt fission gamma-ray emission is a complex phenomenon at the interplay of nuclear reaction and nuclear structure, that depends on the highly excited fission fragment entry state, subsequent neutron emission, and the nuclear structure of the resulting fragment. In the last few years there has been a renewed interest about this observable, as it is a sensitive probe to study the nuclear fission process, and especially the spin distribution of the fission fragments [1-4].

In that respect, the VErsatile SPectrometer Array (VESPA) was built at EC-JRC Geel to study gamma-rays emitted in the spontaneous fission of 252Cf. It consisted of 8 LaBr3(Ce) gamma-ray detectors with excellent timing and energy resolution surrounding a position-sensitive twin Frisch-grid ionization chamber. The first experimental campaign was successfully carried on in 2019-2020. The goal of this campaign was to provide multi-parameters measurements to improve our understanding of the fission process by constraining nuclear fission models such as the FIFRELIN code [5]. In particular, we could obtain the mass and total kinetic energy (TKE) dependence of the prompt fission gamma-ray multiplicity of 252Cf [6].

In this work, we will present the next-order properties associated to these data, that are the mass- and TKE-dependent total gamma-ray energy. Such properties could help understanding the excitation energy sharing between the fragments, as well as the gamma-neutron competition during their de-excitation. The data analysis technique used to extract these properties will be described, and the experimental results will be presented and compared to existing data. Finally, preliminary comparison with FIFRELIN calculations will be discussed.

[1] : A. Chebboubi et al., Phys. Lett. B 775, 190 (2017)
[2] : J.N. Wilson et al., Nature 590, 566 (2021)
[3] : V. Piau et al., Phys. Lett. B 837, 137648 (2023)
[4] : N.P. Giha et al., Phys. Rev. C 111, 014605 (2025)
[5] : O. Litaize et al., Eur. Phys. J. A 51, 177 (2015)
[6] : M. Travar et al., Phys. Lett. 817, 136293 (2021)

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