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# Scission Deformation of the 120Cd/132Sn Neutronless Fragmentation in 252Cf(sf)

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The generation of the fission fragments spins is one of the least understood mechanism and its theoretical description has been subject to renewed interest following Wilson \textit{et al.} [Nature 590, 566 (2021)]. We report on a study of the radiative decay of fission fragments populated via neutronless fission of $^{252}$Cf(sf). In such rare events the fragments are populated below their neutron separation energy, meaning that the radiative decay holds all the information on the generated angular momentum and excitation energy repartition of the fragments. Applying the double-energy method allows for a perfect mass identification of the neutronless fragmentations. In the case of the specific $^{120}$Cd/$^{132}$Sn fragmentation, investigation of the coincident prompt $\gamma$-spectrum showed that $^{132}$Sn was systematically populated in its ground state, hence the excitation energy is solely given to $^{120}$Cd and can be measured. The reproduction of the coincident prompt $\gamma$-spectrum is sensitive to the angular momentum distribution of the studied primary fragment. The latter was estimated using a time-dependent collective Hamilton model [Phys. Rev. C 108, 034616 (2023)], allowing us to constrain for the first time the deformation ($\beta \simeq 0.4$) of the studied fission fragment at scission.

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