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Fission@VAMOS/GANIL: recent results and future

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Fission at low excitation energy has shown over the past decades to be an ideal playground for studying fundamental nuclear properties, in general, and dynamical aspects of nuclear reactions, in particular. While the importance of structural effects in the nascent fragments has been established through numerous studies, the VAMOS campaigns performed during the last few years definitively confirmed the so-far elusive, but clearly dominant, role of specific proton configurations in driving the fission decay of actinides. In addition, the innovative approach implemented at VAMOS made it possible to address the competition between the influence of neutrons and protons with the accurate measurement of elaborate observables such as the fragment N/Z ratio and odd-even effects as a function of excitation energy. Most recently, the enhancement of the set-up permitted to apply the approach to fission of pre-actinides around lead, giving access for the first time in this region to bright new information on fragment isotopic information, N/Z ratio and prompt neutron multiplicity. The unexpected leading role of the proton subsystem with atomic number between the Z=28 and Z=50 characterized by very specific deformations at scission was revealed. Combined with the previously identified stabilizing forces, this finding demonstrates the striking connection between the “old” (actinide) and “new” (pre-actinide) islands of asymmetric fission. This connection is crucial to steer the strive for an unified theory of fission over the nuclear chart.
The recent results obtained at VAMOS are presented, and the “en route”campaigns and projects are discussed. The insight provided by the GANIL approach within the international context of fission studies is finally emphasized.

Author: SCHMITT, christelle (IPHC Strasbourg)

Orateur: SCHMITT, christelle (IPHC Strasbourg)

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