Contribution ID: **20** Type: **not specified**

Fission properties of nuclei in the 180Hg region

Tuesday, 12 June 2018 10:40 (20 minutes)

Nuclei in the neutron-deficient region of $^{180}Hg_{100}$ are different from the actinides traditionally used for fission studies, from the viewpoint of their fission barriers, separation energies and proton-to-neutron ratios. Fission properties of these nuclei were expected to be similar to those of their heavier isotopes around the stability line, known to fission symmetrically. The picture changed drastically in 2010, when the asymmetric-fission mass distribution of the ^{180}Hg nucleus was discovered in a beta-delayed fission of ^{180}Tl in a dedicated experiment at ISOLDE (CERN) [1]. This much unexpected observation promptly attracted extensive attention from both theory and experimental sides, leading to several important conclusions, first of all regarding the importance of the microscopic (shell) effects and their dependence on the excitation energy. Moreover, existence of a new and extended region of asymmetric fission was predicted for neutron-deficient Re-Pb nuclei [2].
In order to investigate fission properties of nuclei in, and the extension of, this predicted region, a dedicated experimental campaign of prompt fusion-fission studies was initiated at the JAEA [3]. In the framework of this program, we investigated fission properties of ^{178}Pt obtained from a complete fusion-fission reaction ^{36}Ar+^{142}Nd $\rightarrow$ ^{178}Pt* at the JAEA (Japan), studied at different beam energies. In order to improve on the precision of the fragment mass distributions, the JAEA experimental setup was upgraded with two time-of-flight sections allowing for independent velocity determination for coincident fission fragments. The made improvement has permitted for correlated fission-fragment mass and kinetic energy measurements, for the first time in the region of the interest.
The obtained final mass distributions are found to be dominated by the asymmetric mass splits, in accordance with the prediction [2]. The contribution of the symmetric-fission events to the measured mass distributions, never done before in the ^{180}Hg region, is on the level of ˜30% and does not change with the beam energy, which is explained by taking into account the rotational energy of the compound nucleus. In the presentation, fission modes'properties of 178Pt are also compared to those of actinides, which allows for better understanding of the modes'dependence on the isospin.

[1] A.N. Andreev et al., Phys. Rev. Lett. 105, 252502 (2010).
[2] P. Moller et al., Phys. Rev. C 85, 024306 (2012).
[3] K. Nishio et al., Phys. Lett. B 748, 89 (2015).

Primary author: Prof. TSEKHANOVICH, Igor (CENBG/Bordeaux University)

Co-authors: Prof. ANDREEV, A.N. (University of York); NISHIO, K. (Japanese Atomic Energy Agency); DENIS-PETIT, D. (CENBG); HIROSE, K. (Japanese Atomic Energy Agency); MAKII, M. (Japanese Atomic Energy Agency); MATHESON, M. (MSU); MORIMOTO, K. (RIKEN); Prof. MORITA, K. (RIKEN); NAZAREWICH, W. (MSU); ORLANDI, R. (Japanese Atomic Energy Agency); SADHUKHAN, J. (Variable Energy Cyclotron Centre); TANAKA, T. (RIKEN); VERMEULEN, M. (Japanes Atomic Energy Agency); WARDA, M. (Marie Sklodowska University)

Presenter: Prof. TSEKHANOVICH, Igor (CENBG/Bordeaux University)

Session Classification: Fission

Track Classification: Fission