Mapping low–energy fission in the very proton–rich nuclei

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In the last decade, through technological, experimental and theoretical advances, the situation in experimental low–energy fission studies has changed dramatically. With the use of advanced production and detection techniques, much more detailed fission information can be obtained for traditional regions of fission research and, very importantly, ***new regions of nuclei*** have become accessible for fission studies.

The talk will give a review of recent low–energy fission experiments in very proton–rich nuclei in the lead region. Results of recent experiments at ISOLDE (CERN) and at SHIP (GSI) on the very exotic process of low–energy beta–delayed fission of neutron-deficient Tl, Bi, At and Fr nuclei will be presented.

Beta-delayed fission is a rare nuclear decay process in which beta-decay of a parent nuclide populates excited states of the daughter, which may then fission. As an example, a beta-delayed fission study of ^{180}Tl at ISOLDE will be discussed in details [**?**]. Recent identification of beta–delayed fission of ^{200,202}Fr, ^{194,196}At and ^{178}Tl at ISOLDE will also be presented. The studies of At and Tl isotopes were facilitated by the use of the highly–selective Resonance Ionization Laser Ion Source of ISOLDE. Furthermore, in complementary experiments at SHIP (GSI) beta–delayed fission of ^{186}Bi and ^{192}At was discovered.

As a result of these experiments, a new region of asymmetric fission was established, which includes isotopes ^{178,180}Hg ($N/Z = 1.22$–1.25), in addition to the previously known broad area of asymmetric fission in the heavy actinides with $N/Z \sim 1.55$–1.6.

Complementary results on higher–energy fission of the long chain of $^{180-194}$Hg isotopes obtained in the measurements at the JAEA tandem will be also presented.

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[1] A. Andreyev *et al.*, Phys. Rev. Lett. **105**, 252502 (2010).