FISSION BARRIERS IN THE NEUTRON-DEFICIENT HG ISOTOPES

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Fission of nuclei from the region of the neutron-deficient Hg isotopes has been recently studied experimentally in the reaction of electron capture delayed fission [1-3]. In ^{180}Hg asymmetric fission was found. This observation was explained theoretically in several papers [1,4-9]. In heavier isotope ^{198}Hg asymmetric mass distribution was also observed in the induced fission reactions [10,11]. Further fission experiments are planned in the neighbouring nuclei. Careful theoretical studies should be performed to understand nature of the fission in neutron deficient Hg region and predict outcome of future experiments.

In this presentation the potential energy surface of the neutron-deficient Hg isotopes from A=178 to 200 are discussed. Calculations were performed in the HFB model with the Gogny D1S parameter set. Multiple constraints on quadrupole, octupole and hexadecapole moments were applied to determine possible fission valleys. Constraint on the neck thickness was also applied.

Asymmetric mass distribution is found in all discussed Hg isotopes. In the most of nuclei potential energy surfaces leading to fission have got multivalley structure at large quadrupole moments. The observed fission paths can be correlated with the structure of nuclei that create the molecular shape of a nucleus in the pre-scission configuration [4,12]. The N/Z ratio should be conserved in such daughter nuclei. Within this condition the structure of magic nuclei is preferred at least in one of the fragment. The structure of the fragments in ^{180}Hg and in ^{198}Hg as well as their fission valleys are distinct. The potential energy surfaces in the isotopes between ^{180}Hg and ^{198}Hg contain mixture of valleys characteristic for these two nuclei.

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