Cluster radioactivity in heavy and superheavy nuclei. The evolution of the super-asymmetric fission valley.*

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Cluster radioactivity Most heavy and super-heavy nuclei decay through fission or alpha emission, but other decay modes can also be noticed. In the 1980s, an exotic decay of cluster radioactivity was observed in actinides [1, 2, 3]. A light nucleus, but heavier than an alpha particle, is emitted in this process. The heavy mass residue is a doubly magic ^{208}Pb in all observed decays of this type.

The theoretical description of this process as a very asymmetric fission has been successfully performed in the HFB model [4]. The analysis of cluster radioactivity fission valley on the potential energy surface has been extended to heavier isotopes. It has been found that the analogue process, with lead as one of the fragments, can be noticed even in super-heavy nuclei [5]. Moreover, the asymmetric fission of the cluster radioactivity type plays non negligible role in this region. In some cases, it may be even the dominant fission channel.

Here we will delimit the region in the chart of nuclides where super-asymmetric fission paths exist and set the limits for the cluster radioactivity decay mode [6]. Selected isotopic and isotonic chains in the region of heavy and superheavy nuclei will be investigated to find the evolution of the super-asymmetric fission valley with increasing number of protons and neutrons.

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