NUCLEAR STRUCTURE INVESTIGATIONS OF HEAVY NUCLEI AND THE DECAY OF SHE

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At present the search for superheavy elements (SHE) can be divided in two approaches: the "cold fusion" reactions employing Pb and Bi targets and the "hot fusion" reactions with a ^{48}Ca beam and actinide targets. The cold fusion reactions with low excitation energies take an advantage of "small" fission probabilities for 1-neutron evaporation channel while the hot fusion reactions rely on "high" fusion probabilities at the expense of higher fission probabilities for an evaporation of > 2 neutrons. In both cases details of the reaction mechanism leading to the formation and survival of SHE at $\sim$ pbarn cross sections is still open. So far the data for cold fusion reactions have shown the exponential decrease of the maximum production cross-section [1]. This behaviour is not understood, nor is the deviation from this in the recent results for the hot fusion reactions performed at JINR in Dubna [2,3,4], though for the latter Z assignments require confirmation. The recent results obtained at GSI, Darmstadt, will be presented together with developments and future plans.

Another interesting field is the nuclear structure study of SHE. Examples are a possible K-isomer in ^{270}Ds [5], evaporation residue-α-γ coincidences of ^{255}Rf and ^{253}No [6], and the population of states in ^{254}No at a spin up to 22 $\hbar$ [7,8,9]. In addition, many other features are summarized in a review article in ref. [10]. Further it is obvious that in order to approach, reach and finally explain in detail the "island of stability", better understanding of both reaction mechanism and nuclear structure are needed. The task can be carried out only by systematic investigation of SHE. As examples the results for nuclei up to Z = 105 obtained at the velocity filter SHIP at GSI will be presented.

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