The V International Scientific Forum "Nuclear Science and Technologies"

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## Investigation of the reactions 232Th + 48Ca and 238U + 40Ar on the SuperHeavy Element Factory

The <sup>232</sup>Th + <sup>48</sup>Ca and <sup>238</sup>U + <sup>40</sup>Ar reactions have been studied at the gas-filled separator DGFRS-2 at the Superheavy Element Factory at Flerov Laboratory of Nuclear Reactions, Joint Institute for Nuclear Research. Three new nuclides were synthesized for the first time: a spontaneously fissioning (SF) <sup>268</sup>Sg with the half-life  $T_{SF} = 13^{+17}_{-4}$  s; an  $\alpha$  decaying <sup>272</sup>Hs with T =  $0.16^{+0.19}_{-0.06}$  s and E =  $9.63 \pm 0.02$  MeV; and <sup>276</sup>Ds with  $T_{1/2} = 0.15^{+0.10}_{-0.04}$  ms, E =  $10.75 \pm 0.03$  MeV, and an SF branch of 57%. For the first time, in 5n-evaporation channel a new isotope <sup>275</sup>Ds with a half-life of  $0.43^{+0.29}_{-0.12}$  ms and  $\alpha$ -particle energy of  $11.20 \pm 0.02$  MeV was synthesized in the <sup>48</sup>Ca-induced reaction with the actinide nucleus and identified by measuring correlated  $\alpha$  decays ending in known nuclei. The decay properties of these nuclei are in agreement with the systematics of experimental partial half-lives and  $\alpha$ -decay energies of heavy known nuclei, as well as spontaneous-fission half-lives. The cross sections of the 4n-evaporation channel of  $0.07^{+0.17}_{-0.06}$  pb,  $0.7^{+1.1}_{-0.59}$  pb, and  $0.11^{+0.46}_{-0.09}$  pb were measured at 231, 238, and 251 MeV, respectively. The cross sections of the 280Ds compound nucleus E<sup>\*</sup> = 51 and 56 MeV, respectively. The cross section of the 2<sup>338</sup>U + <sup>40</sup>Ar reaction at E<sup>\*</sup> = 49 MeV of  $0.18^{+0.49}_{-0.16}$  pb turned out to be comparable to that for <sup>275</sup>Ds at close excitation energy.

## Section

Nuclear physics (Section 1)

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