

Study of the $^{242}\text{Pu} + ^{48}\text{Ca}$ and $^{238}\text{U} + ^{48}\text{Ca}$ reactions at DGFRS-II

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This work presents the results of the experiments performed at the FLNR, JINR Superheavy Element Factory (SHE Factory). The experiments were carried out on the basis of the new cyclotron DC-280 with an intensity of accelerated particles of up to 10 μA [1] and gas filled separator DGFRS-2 [2] and were aimed at study of the $^{242}\text{Pu} + ^{48}\text{Ca}$ and $^{238}\text{U} + ^{48}\text{Ca}$ reactions. The main goal of this experiments consisted in determining the capabilities of the SHE Factory for the production and study of new isotopes of known superheavy elements up to $\text{Og}(Z=118)$, as well as the synthesis of new ones with $Z > 118$.

The decay properties of ^{286}Fl and ^{287}Fl , as well as their α -decay products, have been updated from 25 and 69 new decay chains, respectively. Additionally, 16 decay chains of ^{283}Cn were observed in the $^{238}\text{U} + ^{48}\text{Ca}$ reaction. During the experiment, the maximum intensity of the ^{48}Ca ion beam was 6.5 μA . The stability of the target was measured at such high intensities. Possibility of existing of isomeric states in the ^{287}Fl consecutive α decays is discussed. A new α line with energy of 100-200 keV lower than the main one at 10.19 MeV was observed for the first time for even-even ^{286}Fl . The maximum cross section of $10.4_{-2.1}^{+3.5}$ pb was measured for the $^{242}\text{Pu}(^{48}\text{Ca}, 3n)^{287}\text{Fl}$ reaction.

1. G.G. Gulbekian S.N. Dmitriev, M.G. Itkis, Yu.Ts. Oganessyan, B.N. Gikal et. al. Start-Up of the DC-280 Cyclotron, the Basic Facility of the Factory of Superheavy Elements of the Laboratory of Nuclear Reactions at the Joint Institute for Nuclear Research. // Phys. Part. Nucl. Lett. 16, 866 (2019).
2. Yu.Ts. Oganessian, V.K. Utyonkov et al. DGFRS-2 - a gas-filled recoil separator for the Dubna Superheavy Element Factory. // Nuclear Instruments and Methods in Physics Research (submitted).

The speaker is a student or young scientist

Yes

Section

1. Nuclear structure: theory and experiment

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