

# THE SYSTEMATIC DETERMINATION OF CROSS SECTIONS FOR THE PRODUCTION OF PROTON-RICH EVAPORATION RESIDUES NEAR THE NEUTRON N = 126 SHELL CLOSURE IN FUSION REACTIONS

Krupa L.

Flerov Laboratory of Nuclear Reactions, Joint Institute for Nuclear Research, Dubna, Russia

[krupa@nrmail.jinr.ru](mailto:krupa@nrmail.jinr.ru)

The mass-spectrometer MASHA (Mass-Analyzer of Super Heavy Atoms) was designed for determination of the masses of superheavy elements. The unique property of this mass-spectrometer is his ability to measure masses of the synthesized super heavy isotopes ( $m/\Delta m \sim 1300$ ) simultaneously with registration of their  $\alpha$ -decay or spontaneous fission. The mass-spectrometer is connected to the U-400M cyclotron of the Flerov Laboratory for Nuclear Reactions (FLNR) JINR, Dubna. In order to test the MASHA system we propose to carry out the systematic determination of cross sections for the production of proton-rich evaporation residues (excitation functions) near the neutron N = 126 shell closure in fusion reactions of  $^{16,18}\text{O}$ ,  $^{40}\text{Ar}$  and  $^{48}\text{Ca}$  with isotopes of Sm, Tb, Ho, Er, Tm and  $^{197}\text{Au}$ . The beam energy will be  $E_{\text{beam}} = 5-6$  MeV/n. The fusion reactions with  $^{40}\text{Ar}$  and  $^{16,18}\text{O}$  were investigated experimentally and theoretically in more detail before. These reactions will be used to obtain the main characteristics of the MASHA setup, first of all the extraction efficiency. The fusion reactions with  $^{48}\text{Ca}$  will be carried out for the first time.

Summer practice: Familiarization with experimental setup. Study the papers concerning the synthesis of superheavy elements induced by heavy ions beams. Active participation in controlling and testing the mass-spectrometer "MASHA".

Goals: Acquirement of practical experience in preparation the experiments on synthesis of superheavy elements.

Results: Data processing and analysis of the last experiments on MASHA using the ion beam  $^{40}\text{Ar}$ . Preparation of presentation on MASHA and results obtained on this experimental setup.

Number of students: 2