**Simulated and experimental characteristics of a gas-filled recoil separator DGFRS-II**

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For further physical and chemical studies of superheavy elements (SHEs), SHE Factory was constructed at FLNR JINR. The facility is based on a new DC-280 heavy-ion accelerator that can deliver 48Ca beams with a projected intensity of 6\*1013 ions per second. The first experimental setup of the SHE Factory is a gas-filled recoil separator DGFRS-2 with a QvDhQhQvD magnet configuration. Basic characteristics of DGFRS-2, as well as the results of the first test experiments, are presented. The test results for collection efficiency of evaporation residues (ERs) from reactions with accelerated 48Ca ions and background suppression showed that the new separator allows us to study the properties of superheavy elements formed in complete fusion reactions in the femtobarn cross-section range.

A model of the DGFRS-2 was created using a GEANT4 toolkit. The main methods of trajectory simulations of heavy ions in gaseous media are presented:

1. Forming of a compound nucleus in the target layer.
2. Evaporation of several neutrons from an excited nucleus.
3. Modeling of multiple scattering of ERs in the target and other separator’s media (filling gas, a Mylar window between the separator and detector volumes, pentane in the detector chamber).
4. Calculation of energy losses in the target and gaseous media.
5. Modeling of ERs recharge process in gas.
6. Calculation of recoil trajectory in the magnetic fields of the separator.

The calculated data agreed well with the experimental data generated in test experiments.