

## Referee Report

### “Status of the Factory of Superheavy Elements: 4.3. Separator, target and detector units”

For previous 7 years period and also for period of 2017-2023 one of the main objective in the development of the research infrastructure in JINR is the project DRIBs-III (Dubna Radioactive Ion Beams) as a priority task in Laboratory of Nuclear Reactions (FLNR). It includes three main parts: i) construction of cyclotron DC-280 to provide accelerated ions (expected ion beam intensity is 10 pμA for ions with masses < 100); ii) reconstruction of cyclotron U400M and iii) reconstruction of cyclotron U400. Cyclotron DC-280 should provide 5000 of working hours in year 2018. The most important task of SHE at FLNR is the research of super heavy elements with Z=113-118 and accelerating ions of  $^{50}\text{Ti}$ ,  $^{54}\text{Cr}$  or  $^{58}\text{Fe}$  allowing to reach Z=119, 120.

The referee report is based on the more detailed information included in the file “Status of the Superheavy Elements Factory”, authors I.V. Kalagin, S.L. Bogomolov, A.G. Popeko. The needed isotopes ( $^{232}\text{Th}$  up to  $^{251}\text{Cf}$ ), which are used at SHE in fusion reaction, are produced at Oak Ridge National Laboratory (USA). There are many issues that need to be addressed for target (e.g. cooling, changes in chemical composition of the target, beam diagnostics). The second part of the report covers the construction of separators. For SHE Factory the research team decided to use three different equipment (gas-filled separator for DC-280, velocity filter SHELS for cyclotron U-400, and simplified version of gas-separator). Last part of the report covers briefly the detectors planned to be use by the separators.

It is clear, that there is a necessity to continue with activities connected with target, separators and detector unit for SHE factory. I recommend the continuation of the activities of the groups responsible of all the above mentioned research and development.

I would like to ask to provide the following information:

- 1) The planned budget for construction of target, all three the above mentioned separators, and detection unit. Also provide information about already spent budgets.
- 2) The payment to external organizations.
- 3) The expected date of the full operation of target, gas-separator, velocity filter SHELS, and detection unit.
- 4) Number of people involved in the activities for target, gas-separator, velocity filter SHELS, and detection unit.
- 5) More detailed information about digital electronic system for pulse analysis for DSSD.

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