



Referee Report to the 51st N.P. PAC at JINR:

Status of the Super Heavy Element (SHE) Factory

Presented in the report is the update on the newly commissioned DC-280 cyclotron for the Factory of Super Heavy Elements (SHE) production, an area in which the FLNR has a long established and distinguished leadership. Following the approval of the project, the construction of the SHE factory resumed in 2010, with the initial objective of completing the construction of the Factory building and installation of its engineering systems by June, 2017 [S.N. Dmitriev; PAC report, 2017]. The production of the first beams of accelerated ions and commissioning of the accelerator complex was planned for the end of 2017. A report on the quality control system for construction of the DC-280 cyclotron was presented by Kalagin [PAC 2019] – in which project outline was mapped out which showed the phasing of components; from ion sources and injection to the experimental set-up. Subsequently, the The first beam of $^{84}\text{Kr}^{+14}$ ions was accelerated on December 26, 2018 and extracted to the beam transport channel on January 17, 2019 – and this was almost in line with the original milestone for beam-time delivery! This was followed by experiments on acceleration of ^{84}Kr , ^{12}C , ^{40}Ar and ^{48}Ca ions which were carried out a few months later. Furthermore, tests to determine the efficiencies of ion acceleration in the DC280 were carried out. Beam transmission efficiency of more than 90% were reported for the first beam of $^{40}\text{Ar}^{+6}$ and $^{48}\text{Ca}^{+10}$ ions with intensities <1 mpkA transported to the new gas-filled separator GFS-II beam stopper.

The report also presents the status of completion of commissioning of all the units of the gas filled separator (DGFRS-2). First tests, using alpha particles and products of the reaction $^{nat}\text{Yb}(^{40}\text{Ar},xn)^{207-212}\text{Ra}$ were carried out and PAC looks forward to the presentation of the results of experiments carried out using ^{48}Ca beam and targets of ^{nat}Yb , ^{174}Yb , ^{170}Er , and ^{206}Pb .

A handwritten signature in black ink, appearing to read 'Zilakazi'.

Zebulon Z Vilakazi

20th January 2020