



Velocity filter SHELS at the U400 FLNR cyclotron: performance and experimental results.

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The opportunity to have high intensity ($> 1 \mu\text{A}$) accelerated beams of ions with $A \leq 60$ together with the use of exotic targets provide the possibility to study many aspects of heavy ion induced reactions exploiting new generation of high efficiency, high resolution experimental setups. In recent years, decay properties of heavy nuclei at the focal plane of recoil separators (“decay spectroscopy”) has been very intensively developed. The mixing of α decay with γ and β decay spectroscopy allows to investigate single particle states of heaviest nuclei as well as the spontaneous fission properties of isotopes in the $Z = 98-105$ and $N = 152-162$ region.

The scheme of a velocity filter was chosen for a detailed spectroscopic study of heavy isotopes. New experimental set up named SHELS (Separator for Heavy Element Spectroscopy) was developed, manufactured and installed at the beam of the U400 cyclotron. The ion optical scheme of the new separator can be described as Q-Q-Q-E-D-D-E-Q-Q-Q-D, where Q denotes Quadrupole lenses, E - Electrostatic deflectors, D – Dipole magnets.

The modernized multi-parameter detector GABRIELA (Gamma Alpha Beta Recoil Investigations with the Electromagnetic Analyser) consisting of 5 Ge detectors (1 Clover and 4 single crystal) and double sided silicon detector (DSSD, 128x128 strips) was installed at the focal plane of SHELS. In addition, the separator uses a combined detection system for studying the properties of SF nuclei, consisting of a focal DSSSD-box surrounded by ^3He neutron counters (54 pcs.).

Our report presents the data of experiments made in recent years. A brief overview of the planned experiments and approaches to improving the experimental methodology is given.