“Status of the ACCULINNA-2 fragment separator”

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In March 2017 the first set of radioactive ion beams (RIBs) was obtained from the new in-flight fragment separator ACCULINNA-2 operating at the primary beam line of the U-400M cyclotron. A lot of additional work was done before the first experimental run which was carried out in fall 2017. Namely, the new experimental hall of the setup (the linear part of the radioactive beam line) was fully completed providing all communications and equipment (electricity, air conditions, water cooling, reaction chamber, detectors, electronics etc). Once more the fragmentation reaction ^{15}N (49.7 AMeV) + Be (2 mm) was used for the production of intensive ^{6}He RIB. The obtained ^{6}He beam with energy ~36 AMeV and ~75% purity has intensity around $2x10^{5}$ pps at 0.1 pμA intensity of the ^{15}N primary beam. The ^{6}He beam sport on the physical target (i.e. at the final focal plane of the setup) was ~25 mm in diameter (FWHM). All observed RIB characteristics are in agreement with the estimations given by LISE++ code. The ^{6}He + d experiment, aimed at the study of elastic and inelastic scattering in a wide angular range, was chosen for the first run. Preliminary results of the measurement will be presented. Parameters of optical potential needed for the study of ^{6}He interaction with deuterium nuclei are in the sphere of our interests. The data obtained on the ^{6}He + d scattering, and in the subsequent measurements of the ^{8}He + d scattering, are necessary to complete MC simulation of the flagship experiment ^{8}He + d -> ^{3}He + ^{7}H and moving ahead to make in a fall 2018 the search of the enigmatic nucleus ^{7}H.

It was shown that the new separator provides high quality secondary beams, and it opens new opportunities for experiments with RIBs in intermediate energy range 10-50 AMeV. Other advantages of the new facility equipped with zero-angle spectrometer and RF-kicker will be also reported. The benefits given by the full-scale facility will be necessary for carrying out the first priority experiments, in particular, for the study of ^{7}H, ^{11}Be, ^{17}Ne and ^{26}S nuclei.

Preliminarily, the experimental program for 2018 is looking like this: a) the measurement to collect more statistics for ^{6}He + d elastic-scattering data and make similar measurements for the ^{8}He + d case; b) the investigation of the beta-delayed alpha branch of ^{11}Be using optical time-projection chamber; c) the study of the ^{7}H and its *4n*-decay in the reaction ^{8}He(d,^{3}He)^{7}H.