



13 January 2021

Referee Report to the 52nd N.P. PAC at JINR:

Results of the first experiments with ACCULINNA-2 fragment separator

Presented in the report is the update on a series of pioneering experiments carried out with high intensity radioactive beams using the fragment separator ACCULINNA-2 at the U-400M cyclotron. This is a follow up on the report presented at the 50th PAC NP meeting on preliminary results from work on fragmentation reaction ^{11}B (33.4 A MeV) + Be (1 mm) was used for the production ^8He ($I \sim 10^5$ pps) and ^9Li ($I \sim 10^6$ pps) beams focused on the physical target (cryogenic D₂, T=27 K, P=1.1 atm and 2.4 atm, respectively) on a spot with a diameter of ~ 16 mm (FWHM).

This project seeks to identify the elusive ^7H nucleus and the study of its decay products $t+4n$. In the report, a presentation is made of preliminary results which indicate that the accumulated number of ^7H events in new experiment was more than three times larger in comparison to the first (2018) run, as a result of improvement of the detector set-up that has larger solid angle and thereby allowed for increase in the kinematic reach to smaller centre-of-mass angles. Furthermore, the calibration of the ^7H missing mass spectrum was independently verified by measurement of the missing mass of ^9Li populated in the ^2H (^{10}Be , ^3He) ^9Li reaction at 42 MeV/n ^{10}Be energy. To this end, the authors note that the intention was to obtain new data allowing for the extraction of more information on the excited state in ^7H , and to get clear results that would reliably characterize the ^7H ground state. Most interestingly, the author concludes (among others) – in a manuscript currently under review [1] that there is reliable experimental evidence for the observation of the population of two resonant states in ^7H at 2.2(5) and 5.5(3) MeV relative to $^3\text{H}+4n$ threshold.

To this end, PAC looks forward with eager anticipation at the presentation of these interesting and pioneering findings on such challenging experiments which, I believe, need to be supported.

Yours sincerely

A handwritten signature in dark ink, appearing to read 'Z Vilakazi'.

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