A REFEREE REVIEW

OF THE BECQUEREL PROJECT AND A PROPOSAL TO PROLONG IT

The BECQUEREL Project deals with the use of the beams of stable and radioactive nuclei for the study of their structural features. This method is actively developing in a number of accelerator centers worldwide. Despite of a lasting interest to the peripheral fragmentation of relativistic nuclei, as a way of obtaining the most comprehensive knowledge, experiments in this domain are progressing rather slowly , while exclusive measurements are merely absent due to objective reasons.

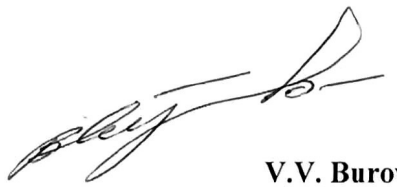
The Project problem, being a traditional one for the emulsion technique, is to outline contours of this pattern on the basis of limited statistics of nuclear interactions which will allow one to orientate future highly complicated experiments with a variety of detectors. The physical results based on the analysis of an emulsion exposed to the stable ^{10}B, ^{11}B, ^{9}Be and ^{14}N and radioactive ^{7}Be and ^{8}B nucleus beams of the JINR Nuclotron in the years *2002 – 2004* have been published. Definite conclusions about the diversity and the significance of the cluster degrees of freedom in light nuclei have been derived. They are given in the text of the Project. The success achieved in the application of the extracted beam channels for the production of radioactive nucleus beams in the framework of the BECQUEREL Project is of special importance for future nuclear physics experiments at the Nuclotron.

A deeply motivated and a quite realistic development involving a subsequent advancement along the proton dripline to ^{9}C and ^{12}N nuclei is suggested for the years *2009-2011.* An appropriate material for the analysis of these nuclei was obtained in *2006.* New exposures in beams enriched with $^{10,11}C$ isotopes are requested. Thus a comprehensive pattern of the relativistic nucleus fragmentation will be created in an unexplored domain within the same experimental approach. Unusual fragmentation modes, as well as nuclear resonant states beyond the proton dripline, are likely expected to be observed.

The obtained results as a whole can stimulate both the development of theoretical description of light neutron-deficient nuclei and new research in the field of nuclear astrophysics and cosmic-ray physics. A detailed knowledge of the structure of the final states of light nucleus fragmentation can serve as a basis for understanding multiple fragmentation patterns of heavy relativistic nuclei. This is a new research stage that can practically be realized in the framework of the emulsion method alone.

Work of the groups involved in the Project is supported by the grants of the Plenipotentiaries of the JINR member-states and national grants. The Project is realized by specialists possessing large experience in this technique. Several young researches from Bulgaria, Russia and Romania are engaged in the work. Their participation is an excellent practical school of personal scientific work. This experience is worth extending. Permanently developed site http;//becquerel.Ihe.jinr.ru/ contains rich information for a wide community of researches in the domain of relativistic nuclear physics.

The status report for the years *2005-2008* and suggestions on the Project prolongation for 2009-2011 deserve full approval.



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