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Study of unstable states of the lightest nuclei in the dissociation of relativistic nuclei.

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The fragmentation of relativistic nuclei observed in its entirety only in nuclear emulsion (NTE) serves as a source of ensembles of the lightest nuclei of interest to cluster physics and astrophysics [1]. NTE allows one to study such ensembles in forward fragmentation cone with record spatial resolution and isotope identification of He and H fragments. Determination of the invariant mass of groups of relativistic fragments in the approximation of conservation of the velocity of the initial nucleus makes it possible to define the source of the formation of the fragments that can be decay of unstable nuclei. Recently, in the events of relativistic dissociation of ^{9}Be, ^{10}B, ^{10}C, ^{11}C nuclei were identified unstable ^{8}Be and ^{9}B nuclei by invariant mass approach [2]. The successful identification of ^{8}Be nuclei allowed us to cross to the problem of identifying triples of alpha particles in the Hoyle state (HS) in the dissociation of relativistic nuclei [3]. The identification of ^{8}Be, ^{9}B, and HS provide a unique opportunity to search for more complex long-lived states such as the Bose-Einstein condensate of α particles or nuclear molecules decaying through the HS and ^{8}Be, as well as ^{9}B.

References:

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