Study of S=-2 Hypernuclei with Hybrid Emulsion Method

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The purpose of E373 experiment is to reveal S=-2 nuclear system. In order to produce nuclei with S=-2, nuclear capture at rest of Ξ^- hyperons is expected to be the most efficient way. Systematic study of Ξ^- capture at rest can provide valuable information about S=-2 system such as double-Λ hypernuclei, the H-dibaryon, Nucleon-Hyperon and Hyperon-Hyperon interactions and also neutron stars. $\Lambda\Lambda$-ΞN threshold energy difference is very small, therefore it is considered that $\Lambda\Lambda$-ΞN conversion is strong in multi-strangeness system.

E373 experiment was carried out using hybrid emulsion method. The emulsion component can be classified two main categories that light nuclei(C, N, O) and heavy nuclei(Br, Ag). An example of absorption Ξ^- in light nuclei is "NAGARA"event, show fig1 . The three vertex events is evidence to be captured Ξ^- by light nuclei.

Another example is one vetex events. Ξ^- absorption event is not only three vertex. It is possible that one vertex event if hypernuclei is produced to be captured Ξ^- by heavy nuclei, show fig2 . What is important in analyzing one vertex events is to measure total visible energy release. The total visible energy release is $E_{visi} = \sum_i^{n=promgs}(K.E._i + 8)$ (MeV).

The question is how many double-Λ hypernuclei had been produced in this experiment. Total visible energy release of each event needs to be examined in detail now, show the total visible energy release distribution of these Ξ^- caputre strars in fig3 . The purpose of this sutdy is to reveal Λ^0 trapping probability following the absorptions of Ξ^- in emulsion nuclei.

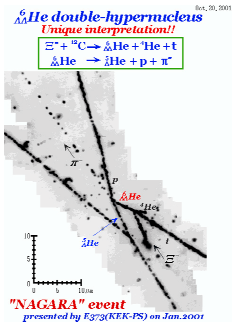

Figure 1:

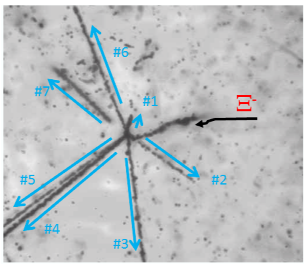

Figure 2:

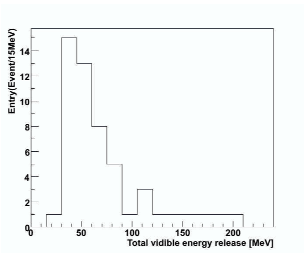

Figure 3: