

Capture reaction of Xi- hyperons at rest in nuclear emulsion

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Hybrid emulsion experiments with counter (E176) and scintillating-fiber (E373) have been carried out to study of double strangeness system such as double- Λ hypernuclei and H-dibaryon. In the E176 experiment, we observed 77.6 ± 5.1 events of Xi- hyperon capture at rest in the nuclear emulsion. Several hundreds' events of Xi- hyperon capture were also observed in the E373 experiment. Among them, we found eight events showing production and sequential decay of light double- Λ hypernuclei. Five events with emission of two single- Λ hypernuclei (twin single- Λ hypernucleus) were also observed. Some of those important events were already reported. Since the previous analyses did not consider the formation of a double- Λ hypernucleus and/or daughter hypernuclei in an excited state (in E176), we reanalyzed those events by using revised version of the range-energy relation and up-to-date values of Λ mass and binding energies of single hypernuclei.

In this paper, we discuss formation probabilities of double and single strangeness system via capture reaction of Xi- hyperon at rest. The binding energies of two Λ hyperons in light nuclei are also discussed using four events of double- Λ hypernucleus. Finally, we introduce a fully approved experiment E07 at J-PARC, briefly, which provides us very rich information of double strangeness systems with ten times' higher statistics than previous experiments.