Development of PID method in nuclear emulsion

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Our goal is to develop image processing method to identify daughter nucleus decayed from double-hypernuclei as many as possible. We carried out the E373 experiment at KEK and detected 7 double-hypernuclei. However, only Nagara event was uniquely identified as ${}^{6}_{\Lambda\Lambda}$He nucleus among them [1]. If we have some method to know daughter nucleus, those events are identified and give us more knowledge. In the E07 experiment at J-PARC, we expect to detect about 10 times more events compared with previous experiment and study double strangeness on Λ-Λ and Ξ-N interaction via double-hypernucleus and twin single-hypernucleus [2]. It is necessary to develop the method to identify daughter nucleus in nuclear emulsion for obtaining new information independent on the Nagara data. We measure track width from stopping point up to ~100 μm along the track with image processing method which reflects energy-losses. The total energy-losses of He, Li, Be and B are relatively larger by 4, 8, 12 and 17 times than that of H, respectively. We challenge to recognize H, He, He, Li, Be and B in the emulsion with the method at RIKEN (NP1406 RRC-32-02). Each emulsion stack is exposed to one particle with several incident angles of θ = 0°, 25°, 50°, 75° from the normal line to the surface of the stack. By the exposure with different angles, we obtain calibration parameters of the track width for each particle due to haloes in non-focal planes of track. We will present the result of the PID method applied for particles Z=1~5 in nuclear emulsion at RIKEN experiment.

[1] J. K. Ahn, *et al*., Phys. Rev. C **88** (2013) 014003.
[2] K. Nakazawa *et al*., J-PARC E07 proposal.