

Inelastic process observed in isobaric charge-exchange reaction of ^{56}Fe at 500 MeV/u

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In the longitudinal-momentum (P_L) distribution of products in isobaric charge-exchange reactions (p, n) and (^3He , t), inelastic component, which is attributed to Δ excitation, has been investigated. For example, Udagawa et al. showed that the inelastic component can be a good probe to study nuclear medium effect on Δ excitation [1]. Recently, inelastic component was successfully observed in P_L distribution with ^{208}Pb beam at 1A GeV by using the spectrometer FRS at GSI [2]. In the present study, the P_L distribution in isobaric charge-exchange reaction was observed at $E = 500$ MeV/u, which is relatively lower than the previous experiments.

The measurement was performed at NIRS. ^{56}Co was produced through isobaric charge-exchange reaction by bombarding a 0.5-mm thick C-target and a 1-mm thick CH_2 target with a primary beam of ^{56}Fe at $E=500$ MeV/u, provided by HIMAC synchrotron accelerator. The target thickness was selected to make the energy loss equivalent for C and CH_2 target. In order to observe the P_L distributions, the magnetic rigidity of the spectrometer was varied with a step of 0.1% of that corresponding to the primary-beam velocity. The produced ^{56}Co was separated and identified with a high-energy transport system, SB2, used as a doubly achromatic spectrometer. P_L distribution with the proton target is provided by subtracting P_L distribution with C target from that with CH_2 target. As shown in Fig. 1, the inelastic peaks are observed for both target nuclei. P_L distribution with the proton target shows similar behavior to that observed in very recent experiment with a ^{136}Xe beam at 500A MeV [3]. The inelastic peak grows and shifts upward for C target compared with proton target.

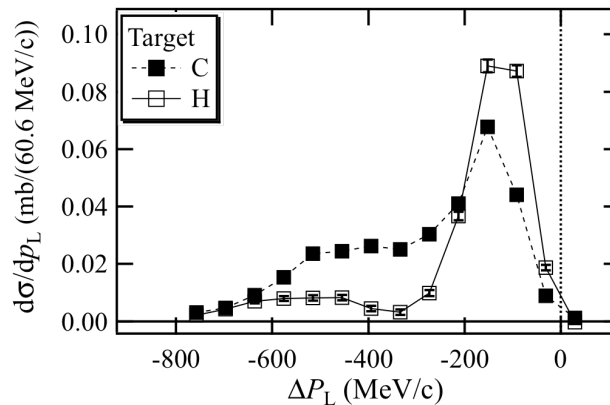


Figure 1: Observed P_L distribution of ^{56}Co in the frame of primary beam.

[1] T. Udagawa et al., Phys. Rev. C 49, 3162 (1994);

[2] A. Kelić et al., Phys. Rev. C 70, 064608 (2004);

[3] J. Vargas et al., Nucl. Instr. and Meth. Phys. Res. A 707, 16 (2013);