MOMENTUM DISTRIBUTIONS AND PRODUCTION CROSS SECTIONS OF PROJECTILE-LIKE FRAGMENTS

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To investigate the production mechanism of projectile-like fragments (PLF's) at intermediate energies, the momentum distributions of PLF's produced in the reactions at $E/A = 95$, 290, and 430 MeV were measured at RIKEN and NIRS. The production cross sections (σ_F's) were derived by integrating observed momentum distributions. The present results are useful to apply the RI beam to the various fields.

At RIKEN, the production rates of PLF's produced in a reaction ^{40}Ar+^{9}Be at $E/A = 95$ MeV were measured as a function of the longitudinal momentum ($P_{\rm L}$) and the transverse momentum ($P_{\rm T}$). In this measurement, the correlation between $P_{\rm T}$ distribution and $P_{\rm L}/A$, which was suggested in [1], was observed clearly. And the dependence of the correlation on the mass of PLF was found.

At NIRS, similar measurements were performed for PLF's from ^{12}C, ^{14}N, ^{16}O, and ^{40}Ar fragmentations at $E/A = 290$ and 430MeV with ^{12}C, ^{27}Al, and ^{197}Au target. The correlation between $P_{\rm T}$ distribution and $P_{\rm L}/A$ was observed as in the measurement at $E/A = 95$MeV. In the reaction ^{40}Ar+^{197}Au at $E/A = 290$MeV, $P_{\rm T}$ distribution was broader than that measured with smaller Z targets. This broadening effect is remarkable for heavier PLF's ($A_{\rm F} > 20$) and negligible for lighter ones. This result implies that the effect of the Coulomb force shrinks caused by the nuclear force in the case of lighter PLF's.

σ_F's derived from observed momentum distributions show the systematics. Considering the present results and the previous measurements, the energy dependence and the target dependence of σ_F will be discussed.

The production mechanism of PLF's will be discussed based on the present results by comparing with the theoretical results.

References

[1] S. Momota *et al.*, Nuclear Physics A, **701**, (2002), 150c

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