Polarization and Momentum Distribution of ^{23}Ne and ^{25}Al produced in One Nucleon Pickup Reactions at 100*A* MeV

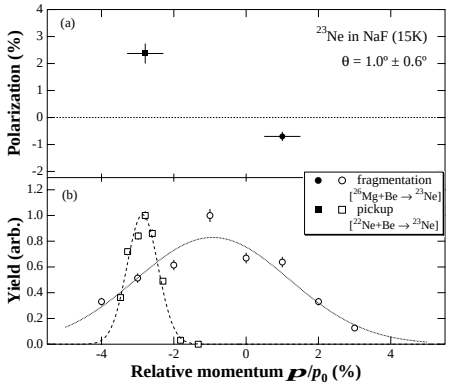
K. Matsuta,[a] M. Mihara,[a] R. Matsumiya,[a] T. Nagatomo,[b] M. Fukuda,[a] S. Momota,[c] Y. Nojiri,[c] T. Ohtsubo,[d] T. Izumikawa,[d] S. Takahashi,[d] H. Hirano,[d] A. Kitagawa,[e] M. Torikoshi,[e] M. Kanazawa,[e] S. Sato,[e] T. Minamisono,[f] J.R. Alonso,[g] G.F. Krebs[g] and T.J.M. Symons[g]

[A] *Dept. of Physics, Osaka Univ.,* [b] *RIKEN,,* [c] *Kochi Institute of Technology*
[d] *Dept. of Physics, Niigata Univ.,* [e] *National Institute of Radiological Sciences*
[f] *Fukui Univ. of Technology,* [g] *Lawrence Berkeley Laboratory*

Polarization phenomena in the intermediate energy heavy ion collisions are not only useful to produce polarized radioactive nuclear beams, but also important to understand the reaction mechanism. Polarization mechanism for the projectile fragments have been studied very well and the phenomenon is now relatively well understood. However, polarization of the pickup reaction products, recently observed by a couple of groups[1,2], has not been fully understood, yet. In the present experiment, the momentum distribution and the polarization of pick-up-reaction products ^{23}Ne and ^{25}Al were observed at 100*A* MeV by means of β-NMR technique, in order to understand the mechanism for the reaction and the polarization.

The ^{23}Ne and ^{25}Al nuclei were produced in one neutron or one proton pickup reactions in the ^{22}Ne or ^{24}Mg on Be collisions at 100*A* MeV. The product nuclei were separated in a fragment separator installed in the secondary beam line at HIMAC in NIRS. The reaction angle was selected to introduce polarization in the reaction products. The nuclei were stooped in the downstream and the β rays were observed. Polarization was observed by means of β-NMR technique. Typical momentum distribution and polarization are shown in the figure, together with those for projectile fragment.

Some of the features of the observed momentum distribution and the polarization are the strong deceleration, the sharper width compared with the projectile fragmentation process, and large persistent positive polarization. Reaction mechanism will be discussed from these features.



[1]D.E. Groh etal.,Phys.Rev.lett., **90** 202502 (2003).
[2]K.Turzo, etal., Phys.Rev.C **73** 044313 (2006).