REACTION CROSS SECTIONS FOR ^{12}N AT INTERMEDIATE ENERGIES AND ITS NUCLEAR STRUCTURE

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The reaction cross section is an important physical quantity that reflects information of nuclear sizes or nucleon density distributions. This quantity has led to discoveries of many nuclei with neutron / proton halo and skin structures.

In this study, we focused on the proton drip-line nucleus ^{12}N ($T_{1/2}$=11ms, $I^{\pi}=1^{+}$) which has a quite small one-proton binding energy of 0.601 MeV. For proton-rich nuclei, the Coulomb barrier tends to prevent the valence proton from extending to the outer region. For ^{12}N, the valence proton is considered to sit in the p-orbital, so the centrifugal barrier also has a similar effect. Therefore, the relation and balance of these effects are quite interesting in ^{12}N.

Systematic measurements of reaction cross sections for ^{12}N on Be, C, Al and CH_2 targets are performed at intermediate energies between 55A - 200A MeV. The experiments were carried out at the heavy-ion synchrotron facility HIMAC at National Institute for Radiological Sciences, Japan. The present systematic data with the existing data at 700A MeV [1] were used in the analysis using the Glauber-type calculation to deduce the nucleon / neutron / proton density distributions of ^{12}N. The deduced nucleon density distribution of ^{12}N shows a small amplitude by a factor in the tail (outer) region, even compared with the single-particle density reproducing the one-proton binding energy with the Coulomb and centrifugal potentials. In this presentation, the result will be reported and discussed in relation to its nuclear structure.

REFERENCES

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