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POLARIZATION ANALYZING POWERS OF $^{12}C(p,p)^{12}C$ REACTION AT A FEW MEV

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The absolute polarizations in $^{12}C(p, p)^{12}C$ were measured at a laboratory angle of 50° for seven energies between 2.0 and 4.5 MeV in order to use as a polarimeter.

A schematic drawing of the geometry of the arrangement is shown in Fig. 1. The slit system limited the spread in the first scattering angle to $\pm 2.7°$ and in the second scattering angle to $\pm 3.3°$. The self-supporting carbon foils were prepared with the thermal cracking method and the thickness were estimated 4.2 mg/cm^2 and 4.5 mg/cm^2 for the first target and the second, respectively, by using a balance.

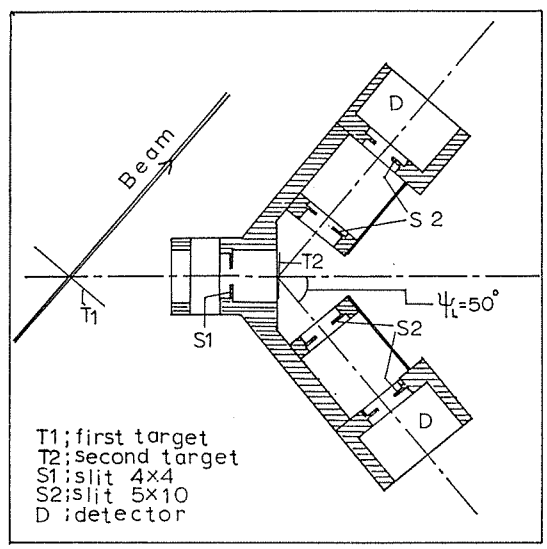

Fig. 1. Schematic drawing of the double scattering apparatus.

In order to cancel small differences in the detecting efficiencies and solid angles as well as a small nonuniformity in the second target,[1] we measured the so called right-to-left scattering asymmetries by changing the first scattering to the right and to the left of the

incident proton beam. The most probable value was taken to be the geometric mean of the values measured with the above method.

The results of these measurements were shown in Fig. 2 with the results measured by S.J. Moss and W. Haeberli,[2] and one measured by S. Gorodetzky et al.[3]. The absolute sign of the polarization in this measurement was determined using the sign of previous measurement with the analyzing power of helium by S.J. Moss and W. Haeberli.[2] The results were not corrected for finite geometrical effects and target contaminants. The energy spread shown in Fig. 2 indicated the thickness of the carbon foil including the kinematical spread and the errors quoted in the polarization were the statistical errors only. The agreement with other results was seemed to be quite good between 4.0 and 4.5 MeV.

In the proton-energy region below 3.5 MeV, the magnitude of the polarization produced in p-^{12}C elastic scattering at 50° (lab.) was measured in this experiment and this magnitude decreased slowly as the energy decreased. Therefore, when the polarization excitation functions between 2.0 MeV and 3.5 MeV were measured, the polarimeter seen in Fig. 1 would sufficiently be used. In practice, this polarimeter was used to measure the polarization excitation functions for ^{62}Ni (p, p) ^{62}Ni reaction.[4]

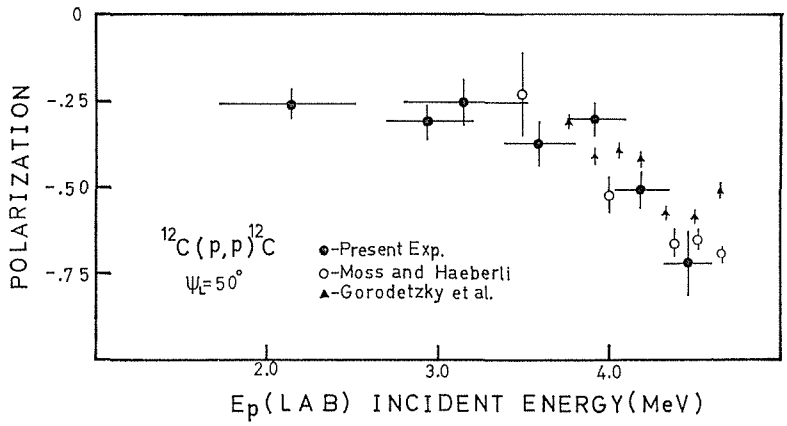

Fig. 2. Absolute polarizations measured at 50° (lab.) compared with other results.

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