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1.41 ^{24}Mg ($\vec{p}$, d)^{23}Mg REACTION TO 2.36MeV STATE (l=0, 1/2$^+$) BETWEEN 30 AND 40MeV

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The ^{24}Mg (p, d) ^{23}Mg reaction for the l = 0 transition is considered to be anomalous, since the standard DWBA calculations can not reproduce the experimental data of the differential cross sections as well as the analyzing powers around 90 MeV, which was first pointed out by J. R. Shepard *et al.* [1]. Recently, additional measurements of the differential cross sections and the analyzing powers have been done to make clear these behaviors in this energy region [2] [3].

We have investigated this reaction between 30 and 40 MeV using the polarized proton beam from the INS-SF cyclotron. The averaged beam polarization was about 60% which was monitored by the carbon polarimeter with the plastic scintillation counters, which were set at the upper stream of the scattering chamber. The beam intensity was about 25 nA on target. The beam polarization was inverted every a few seconds by changing the rf-transitions,

The reaction particles were analysed in momentum by high resolution QDD-type magnetic spectrograph and detected with the 80-cm focal plane detector of resistive wire type. The plastic scintillation counter was also used for the energy measurement and particle identification. An enriched self-supporting ^{24}Mg target of about 700 μg/cm^2 was used, in which a small amount of carbon was contaminated. As the deuterons leading to the ^{23}Mg states overlapped with those of ^{12}C (p, d) ^{11}C reaction at some angles, additional measurement on the ^{12}C target was also done for subtraction.

The angular distributions of the analyzing powers as well as the differential cross sections were obtained for the transitions leading to several low lying states of ^{23}Mg. Fig. 1 shows the results for the 2.36 MeV, l = 0 ; 1/2$^+$ state at 30, 35 and preliminary 40 MeV. The analyzing powers at these energies are drastically but systematically changed from those in higher energy region, though the differential cross sections show nearly the same angular distributions.

Standard DWBA calculations using the same optical potential parameters as used by K. Hatanaka *et al.* [2] were tried to compare with present data. The calculated results are also shown in Fig. 1. These preliminary calculations with parameters for higher energies cannot reproduce well the data in the present energy region, especially for the energy dependence. The additional measurements at 40 MeV and detailed analyses are in progress. Energy dependence of this reaction will be discussed.

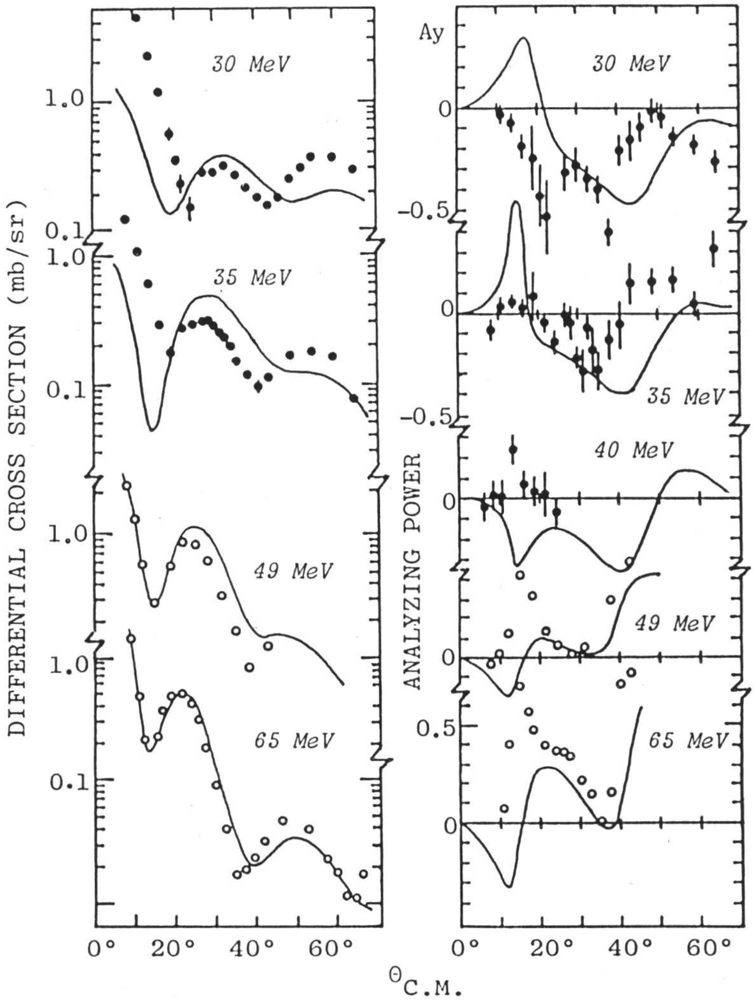

Fig. 1. The angular distributions of the differential cross sections and the analyzing powers for the $^{24}Mg(\vec{p},d)^{23}Mg$ reaction to the 2.36 MeV, $l=0$; $1/2^+$ state at 30, 35 and 40 MeV. The data at 49 and 65 MeV of *Refs. 3)* and *2)*, respectively, are also shown for comparison. The solid lines show the preliminary DWBA calculations using the same optical potential parameters used by K. Hatanaka *et al.* [2].

References:

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