The ^{44}Ca($\vec{p}, \alpha$)^{41}K Reaction

P. Guazzoni [a], S. Russo [a], M. Sassi [a], L. Zetta [a], F. Della Vedova [b], S.M. Lenzi [b], A. Vitturi [b],
G. Graw, R. Hertenberger, H.-F. Wirth, and M. Jaskóla [c]
[a] Dipartimento di Fisica dell'Università and I.N.F.N, I-20133 Milano, Italy
[b] Dipartimento di Fisica dell'Università and I.N.F.N., I-35131 Padova, Italy
[c] Soltan Institute for Nuclear Studies, Warsaw, Poland

The measurement of the ^{44}Ca($\vec{p}, \alpha$)^{41}K reaction is part of the program devoted to investigate the homologous state concept in the mass region of A $\simeq$ 40.

The angular distributions of cross sections $\sigma(\theta)$ and analyzing powers $A_y(\theta)$ of this triton-pickup reaction have been measured from 10^o to 60^o, in a high resolution experiment, with the 24.6 proton beam of the Munich MP Tandem Accelerator, using the Stern-Gerlach source for intense and bright beams of negative polarized Hydrogen ions [1]. The reaction products have been analyzed with the Q3D magnetic spectrograph and detected in the new light ion focal plane detector [2]. The beam current intensity was up to 1.5μA and the beam polarization 60%.

A DWBA analysis of $\sigma(\theta)$ and $A_y(\theta)$ has been performed assuming a semimicroscopic triton cluster pickup mechanism. The calculations have been done in finite range approximation with the code TWOFNR [3], using a Gaussian proton-triton interaction potential. Table 1 reports the set of optical model parameters used in the DWBA analysis for ingoing proton- [4] and outgoing α-channels [5]. Figures 1 and 2 show the comparison between experimental and calculated $\sigma(\theta)$ and $A_y(\theta)$ for the population of some ^{41}K levels.

References

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[3] M. Igarashi, Computer code TWOFNR (1977), unpublished
[4] F.G. Perey, Phys. Rev. **131** (1963) 745
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	V_r (MeV)	r_r (fm)	a_r (fm)	W_v (MeV)	r_w (fm)	a_w (fm)	W_d (MeV)	r_d (fm)	a_d (fm)	V_{so} (MeV)	r_{so} (fm)	a_{so} (fm)	r_c (fm)
p	46	1.22	0.6				10.5	1.22	0.5	5	1.25	0.45	1.25
α	185	1.35	0.6	25	1.35	0.6							1.40
B.S.		1.45	0.4										

Table 1: Optical model parameters used in DWBA calculations.

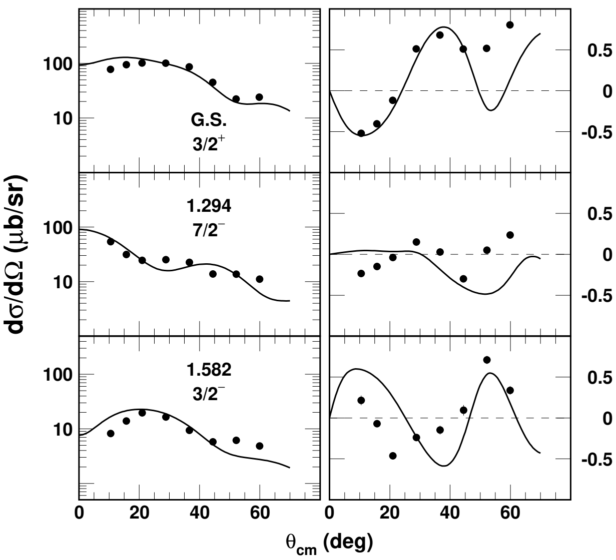

Fig. 1: Comparison between experimental (dots) and theoretical (solid lines) $\sigma(\theta)$ and $A_y(\theta)$ for some low lying ^{41}K levels

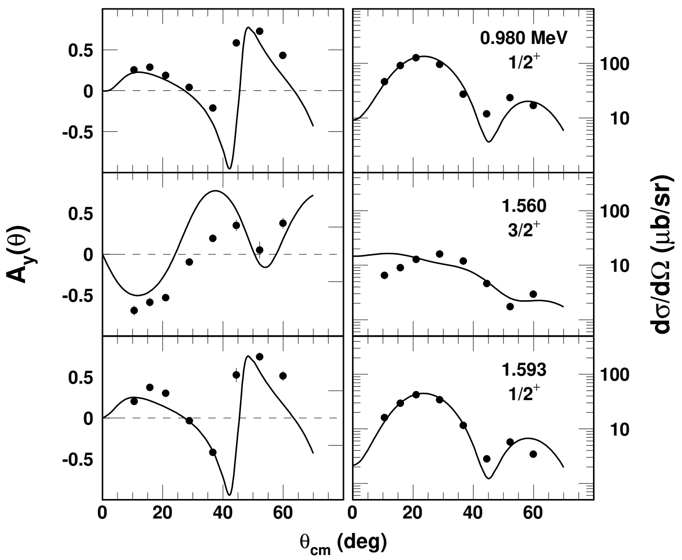

Fig. 2: Comparison between experimental (dots) and theoretical (solid lines) $\sigma(\theta)$ and $A_y(\theta)$ for some low lying ^{41}K levels