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ANALYSIS OF QUASI-ELASTIC KNOCKOUT OF ALPHA PARTICLES FROM ^{16}O AND ^{28}Si BY 0.65 AND 0.85 GeV ALPHA PARTICLES

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An analysis is in progress of quasi-elastic data taken in a coplanar geometry with angular settings (θ_1,θ_2) for the two arms of the detection system of (31°,57°), (36°,41°) and (43,5°, 43,5°). The acceptances of the two arms are $\Delta\Omega_1 \geq$ 5 msr and $\Delta\Omega_2 \geq$ 60 msr. We are using both the plane wave impulse approximation (PWIA) and the distorted wave impulse approximation (DWIA). The measured differential cross sections $d\sigma/d\Omega$ were obtained by integrating over $\Delta\Omega_2$, integrating over the momentum spectrum measured by the detector arm at θ_1, and by summing over the excitation energy of the residual nucleus. Experimental results are : 1) at 0.85 GeV, $d\sigma/d\Omega$ for ^{16}O is 2.5 times larger than for ^{28}Si at (θ_1, θ_2) = (43,5°, 43,5°) ; 2) for ^{16}O, $d\sigma/d\Omega$ at (43,5°, 43,5°) at 0.65 GeV is 4 times larger than at 0.85 GeV. Using PWIA, $d\sigma/d\Omega$ was calculated making the assumption that the off-energy shell α-α cross section is equal to the measured on-shell α-α cross section. This is justified because the measured variation of α-α scattering as a function of momentum transfer at fixed incident energy, and as a function of incident energy at fixed momentum transfer is consistent with a few percent correction resulting from the use of on-shell α-α cross sections. The wave functions for the (α-cluster + residual core) system was calculated using a square well potential. A single parameter, N_{eff}, which is the effective number of alpha particles, was adjusted to bring the calculationinto best agreement with $d\sigma/d\Omega$. Good fits were obtained for both targets ; the results for ^{16}O at 0.85 GeV is shown in the figure. The values of N_{eff} are $0.34^{+0.09}_{-0.05}$ and $0.20 \pm ^{0.10}_{0.08}$ for ^{16}O and ^{28}Si respectively. Fits to $d\sigma/d\Omega$ employing DWIA will be reported. The effect of distorted waves is determined from analysis of α-^{12}C elastic scattering at T_α= 104, 139, 147, 166 and 1370 MeV. A straight line interpolation of the volume integrals, J_R and J_I, for real and imaginary parts of the potential plotted against Ln T_α is consistent with the optical model analyses of the elastic scattering data. Values of J_R and J_I for 200 $\leq T_\alpha \leq$ 850 MeV are needed in this analysis . In this interval, J_R decreases to nearly zero and J_I is constant. Thus except for the lowest energy alphas observed, the distortive effect is mainly due to attenuation.