

II-19

Measurement of the Nuclear Quadrupole Moment of ^{165}Ho by
 Proton and Alpha Scattering from an Aligned Target

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The scattering of protons and alpha particles from an aligned ^{165}Ho target has been studied, and the nuclear quadrupole moment has been extracted from the data. A description of the aligned target together with preliminary proton scattering data has been given previously.¹⁾ The new data are shown in Figs. 1 and 2. The quantity $\Delta\sigma/\sigma$ is the percentage difference $(\sigma_c - \sigma_w)/\sigma_w$ where σ_c is the cross section when the target is highly oriented (0.200K, $B_2/B_2(\text{max}) = -0.344$) and σ_w is the cross section when it is only slightly oriented, (1.5K, $B_2/B_2(\text{max}) = -0.023$). The curves were calculated with an adiabatic coupled channels code.

The optical parameters of Aponick *et al.*²⁾ were used for the fits to the alpha particle data. An acceptable fit was obtained with parameter set I but not with set II. The parameters of Tamura,³⁾ with the real potential reduced to 47 MeV, were used to fit the proton data. Best fits were obtained with a nuclear deformation $\beta = 0.288$ for the proton data and $\beta = 0.326$ for the alpha data giving an average value $\beta = 0.307 \pm 0.030$ ($Q_0 = 7.30 \pm 0.70$ b). The major contribution to the experimental uncertainty comes from a 10% uncertainty in the temperature of the target.

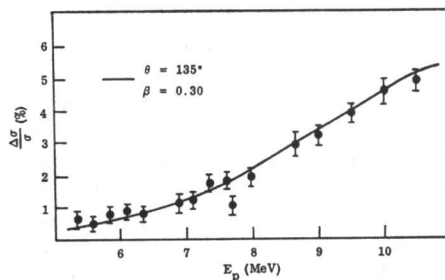


Fig. 1

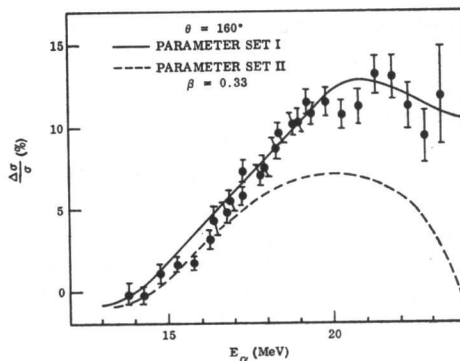


Fig. 2

References

- 1) T. R. Fisher, S. L. Tabor and B. A. Watson: Phys. Rev. Letters **27** (1971) 1078.
- 2) A. A. Aponick, Jr., C. M. Chesterfield, D. A. Bromley and N. K. Glendenning: Nuclear Phys. **A159** (1970) 367.
- 3) T. Tamura: Phys. Letters **9** (1964) 334.