an applicator for practical use. These experiments can then be repeated using an ionization chamber method[3,4]. Once carefully calibrated, this applicator could be tried out on animals and later on humans.

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Angular Distribution of α-Particles from the $Li^7(p,\alpha)He^4$ Reaction

A RECENT investigation by Heydenburg *et al.*[1] of the angular distribution of α-particles from the $Li^7(p,\alpha)He^4$ reaction for proton energies greater than 1 MeV. indicates that the asymmetry of this angular distribution may be represented by the expression:

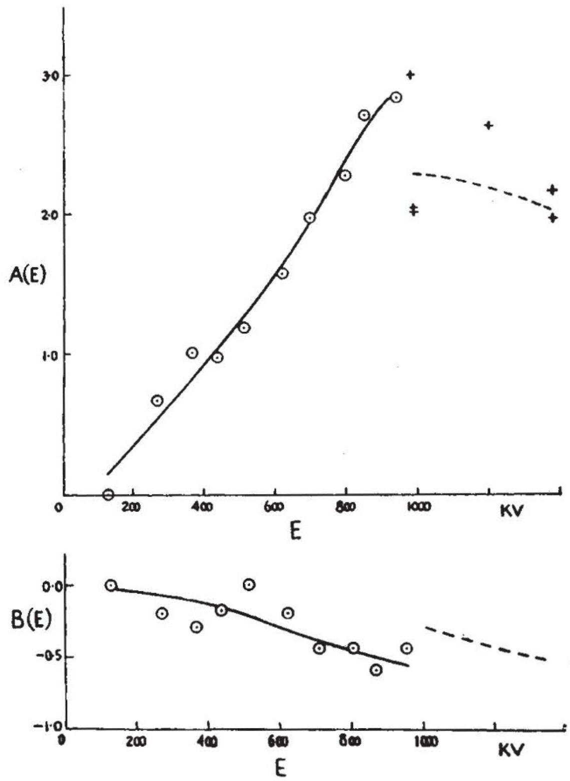
$$Y(\theta) = Y(90^\circ)\,[1 + A(E)\cos^2\theta + B(E)\cos^4\theta].$$

The inclusion of the last term implies the existence of *f*-protons in the reaction as well as *p*-protons. Experiments[2] have been carried out earlier at energies less than 1 MeV.; but in general the values of $\cos^2\theta$ have been less than 0·8 and have therefore failed to reveal a $B(E)\cos^4\theta$ term.

We have examined the distribution of the α-particles from this reaction for proton energies ranging between 130 keV. and 960 keV. using nuclear emulsion plates in a camera which permits observation of α-particles in the angular ranges 13–90° and 167–90° to the incident proton beam on each plate exposed. These correspond to a range in $\cos^2\theta$ of from 0·95 to zero—a wider range than has been used in most previous investigations. A full description of our apparatus, experimental procedure, and the initial results obtained appears elsewhere[3].

Careful re-examination of our original data showed that the magnitude of $B(E)$ was very sensitive to target thickness. It appears that some of our targets were thicker than we had estimated by visual comparison with others the thickness of which was determined from γ-ray resonances (< 25 keV.). A check on the thickness of each target was made by determining the yield of tracks in a given direction on each plate per microcoulomb of protons. We have extended our measurements on the best of our original plates and have combined them with measurements on further plates exposed using thin targets (< 10 keV. thick). In all, a quarter of a million α-particle tracks have been counted.

The coefficients $A(E)$ and $B(E)$ were obtained from the curves showing the relative yield of α-particles as a function of $\cos^2\theta$ at each of the ten bombarding energies used. The method of curve fitting used was to obtain the best fit by eye and then to improve this fit by the method of successive approximations.



Variation of $A(E)$ and $B(E)$ with energy.
+ – – – + – – –, Heydenburg *et al.*

The least squares method, treating each point with equal weight, when tried for typical cases, gave the same values of the coefficients. A least squares analysis in which the points are given appropriate weights is at present in hand. The accompanying graphs show the values of $A(E)$ and $B(E)$ derived from these curves. At energies of 0·5 MeV. and less, where the term $B(E)\cos^4\theta$ approaches zero, our values for $A(E)$ are in approximate agreement with other observations[2]. At about 1 MeV., our results are in agreement with the higher values obtained by Heydenburg *et al.*[1] at 1 and 1·2 MeV.

It is difficult to obtain precise values for $B(E)$, and our values can only suggest the trend of variation of $B(E)$ with E. Our measurements indicate that $B(E)$ is very small below 0·5 MeV. and then approaches a value of approximately − 0·5 at 1 MeV., in substantial agreement with the results of Heydenburg *et al.* at 1 MeV.

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