nominal fields of 14,250, 11,900, and 10,100 gauss. The frequency ratios for V^{50} relative to Cl^{35}, Rb^{85}, and deuterium gave:

$$\nu(V^{50})/\nu(Cl^{35}) = 1.01758 \pm 0.0001,$$
$$\nu(V^{50})/\nu(Rb^{85}) = 1.03262 \pm 0.0001,$$
$$\nu(V^{50})/\nu(D^2) = 0.649527 \pm 0.00007.$$

The sign of the moment of V^{50} has been determined to be positive by direct comparison with Rb^{85} and Cl^{35} resonances. The observed line widths at 10,100 gauss were 1.75, 2.1, and 0.92 gauss for V^{50}, Rb^{85}, and D^2, respectively. Using a value of 2.79268 $\pm$0.00006 nm[3] for the proton moment, and Levinthal's[4] value for the deuteron-to-proton frequency ratio, and a spin of 1 for the deuteron, the nuclear gyromagnetic ratio for vanadium 50 becomes $+0.55690 \pm 0.00006$.

Frequency measurements were made at the same nominal fields for Rb^{85}, Cl^{35}, and D^2. The ratios measured with deuterium were converted to those relative to the proton by using Levinthal's deuteron-to-proton frequency ratio of 0.1535059. In Table I, our results are compared with other published values.

TABLE I. Comparison of results.

	Frequency ratio	Method	Reference
$\nu(Rb^{85})/\nu(Cl^{35})$	=0.98545 ±0.00042	Indirect	Bitter[a]
	0.98592 ±0.0008	Indirect	Chambers and Williams[b]
	0.98541 ±0.00015	Direct	This report
$\nu(Rb^{85})/\nu(H^1)$	=0.096574 ±0.00004	Indirect	Bitter[a]
	0.09661 ±0.00004	Direct	Chambers and Williams[b]
	0.0965521 ±0.0000003	Direct	Yasaitas and Smaller[c]
	0.096554 ±0.00001	Indirect	This report
$\nu(Cl^{35})/\nu(H^1)$	=0.097999 ±0.00005	Indirect	Bitter[a]
	0.09799 ±0.00007	Direct	Chambers and Williams[b]
	0.097978 ±0.00009	Direct	Proctor and Yu[d]
	0.097985 ±0.00001	Indirect	This report

[a] F. Bitter, Phys. Rev. **75**, 1326 (1949).
[b] W. H. Chambers and D. Williams, Phys. Rev. **76**, 638 (1949).
[c] E. Yasaitas and B. Smaller, Phys. Rev. **82**, 750 (1951).
[d] W. G. Proctor and F. C. Yu, Phys. Rev. **81**, 20 (1951).

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[1] W. G. Proctor, Phys. Rev. **79**, 35 (1950).
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Tin Activation of LiI

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CRYSTALS of LiI with thallium activation have been shown[1] to respond to thermal neutrons.

In the course of testing the effect of various activators in LiI, it was found that a strong luminescence occurred under ultraviolet excitation when LiI was activated by tin. In order to determine its response to slow neutrons, crystals of this phosphor containing about 0.1 mole-percent of SnI_2 were grown from the melt. One of these crystals was selected which was about 1×0.5×0.5 cm in size, irregular in shape, transparent, and ranging in color from faint yellow to nearly colorless. The crystal was ground smooth on one side and optically connected to a 5819 photomultiplier through a 1-inch-diameter by 0.5-inch-long Lucite light piper. White Vaseline was used to join the crystal, Lucite, and photomultiplier. An aluminum can covering the crystal and clamped with an "O" ring to the Lucite served as a reflector and as a means of maintaining the crystal in an atmosphere of dry nitrogen.

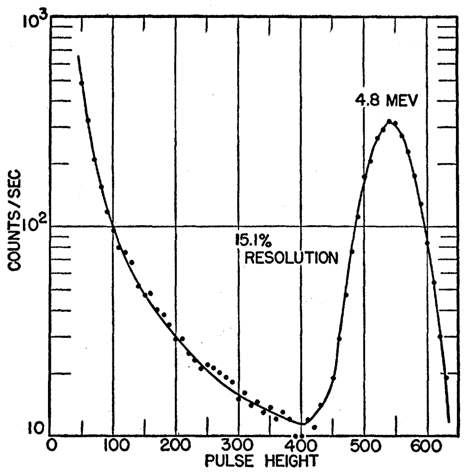

FIG. 1. Slow neutrons on LiI $-SnI_2$.

The crystal was exposed to uncollimated neutrons from an unshielded Po−Be source. A flux of slow neutrons was obtained by placing a block of paraffin behind the source. The measured photomultiplier pulse-height spectrum is shown in Fig. 1. Even in the presence of the γ-rays and fast neutrons emanating from the source, and in spite of the irregularity and nonuniformity of the crystal, the pulse-height spectrum exhibits a resolution of 15.1 percent for the monoenergetic excitation of the phosphor from the reaction of the moderate neutrons with the Li^6.

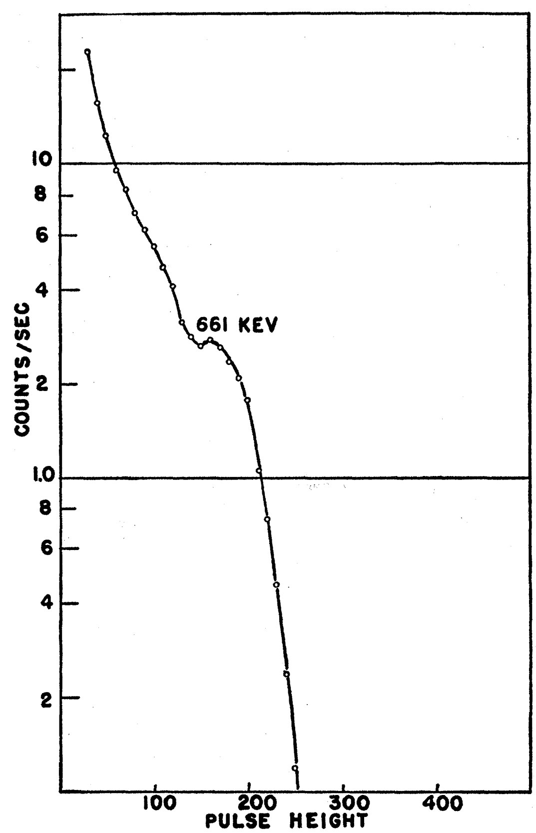

FIG. 2. Cs^{137} γ-rays on LiI $-SnI_2$. The pulse-height scale is twice that of Fig. 1.

Figure 2 is the pulse-height spectrum of the same crystal and mounting showing the peak due to photoelectrons from Cs^{137} γ-radiation. A similar spectrum was taken after replacing the $LiI-SnI_2$ with a $NaI-TlI$ crystal. A comparison of the pulse heights at the photoelectric peaks gives an electron excitation efficiency for $LiI-SnI_2$ relative to $NaI-TlI$ of 1/24.5. A comparison of the pulse heights with $LiI-SnI_2$ for Cs^{137} γ-rays and for neutrons, assuming linearity, gives a Q of 4.5 Mev for the $Li^6(n, \alpha)H^3$ reaction which is 94 percent of the correct value of 4.785 Mev.

The scintillations produced by neutrons on $LiI-SnI_2$ which were detected by the photomultiplier were observed on an oscilloscope, and the decay of fluorescence appeared to be purely exponential with a time constant of about 0.7 microsecond.

* On loan from American Cyanamid Company, Arco Reactor Testing Station.

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High Energy Photodisintegration of the Deuteron*

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THE differential cross section has been measured for protons arising from the photodisintegration of the deuteron at laboratory angles of 60°, 90°, and 120° for γ-ray energies ranging from 80 to 160 Mev. The technique used was essentially that used in a previous experiment[1] on the photodisintegration of He^4. The pressure chamber (Fig. 1) has been modified slightly by introducing an internal collimator and decreasing the solid angles of the counter telescopes. Synchrotron γ-rays of maximum energy 300 Mev were admitted to the chamber and particles were counted which traversed the first crystal and lost at least 20 Mev in the second crystal. The pulses observed in the first crystal are the result of protons arising from photodisintegration and those mesons which produce stars losing more than the required 20 Mev in the second crystal. The two kinds of particles may be separated in the first crystal by a pulse-height analysis. In Fig. 1 the chamber is shown in the position for the 60° and 90° runs. The rear section of the chamber can be reversed to correspond to the 90° and 120° runs. The energy of the protons counted could be varied by inserting various combinations of the movable absorbers mounted in the chamber. The counter telescope was calibrated roughly using a ThC″ source and more exactly by raising the bias on the back crystal until the proton counting rate went to zero. This procedure should give a linear curve for the number of protons *vs* bias extrapolating to the energy thickness of the crystal.

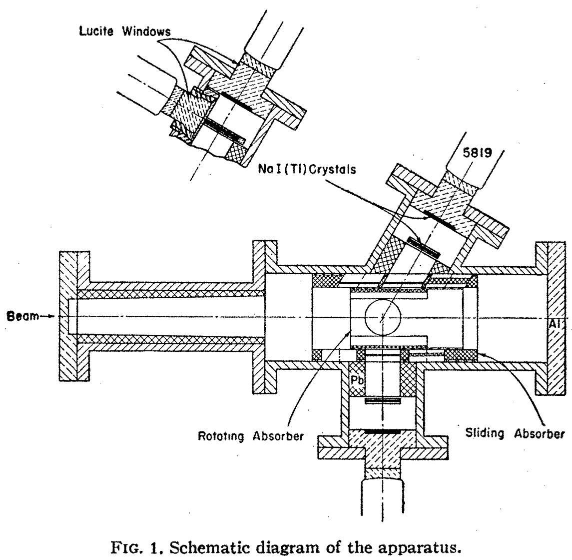

FIG. 1. Schematic diagram of the apparatus.

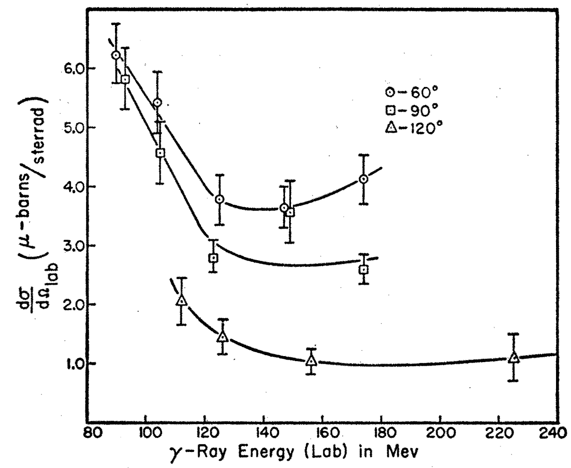

FIG. 2. Differential cross section for photodisintegration of the deuteron *vs* γ-ray energy at 30°, 60°, and 90° (Lab. system).

With the knowledge of the proton angle and energy one can obtain the energy of the γ-ray causing the photodisintegration. The results obtained are shown in Fig. 2 for laboratory angles of 60°, 90°, and 120°. If one assumes an angular distribution of the form

$$d\sigma/d\Omega = [\sin^2\theta(a+b\cos\theta)+c]/8\pi$$

and converts the results of Fig. 2 into the center-of-mass system, one obtains for the total cross section the values shown in Fig. 3. Along with these is plotted the photoelectric dipole cross section given by Schiff[2] and Marshall and Guth[3] for a Yukawa well of effective range of 1.74×10^{-13} cm with 50 percent exchange force. The errors shown are based on counting statistics alone. The ab-

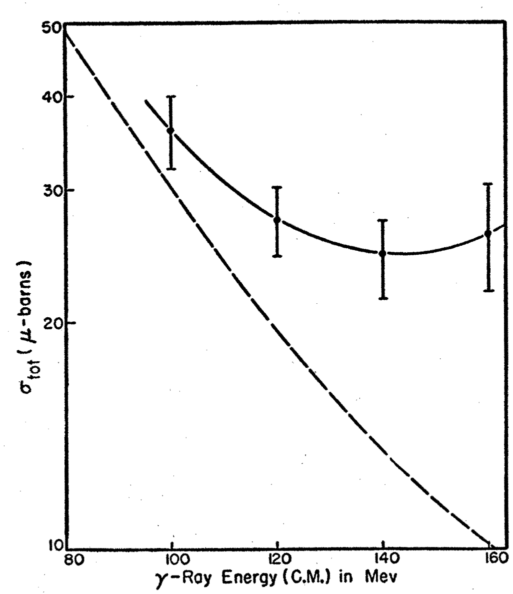

FIG. 3. Total cross section for photodisintegration of the deuteron (cm system). The solid line represents the experimental data. The dashed line is the electric dipole cross section obtained from references 2 and 3.