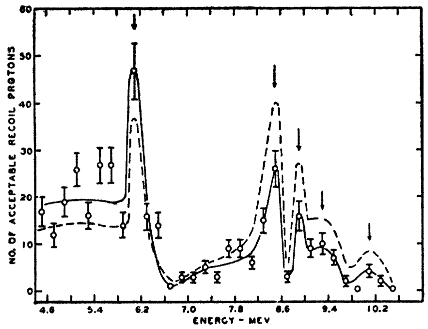

FIG. 2. Energy distribution (observed and corrected) ranging from 4.2 Mev to 10.5 Mev of the recoil protons projected in the forward direction by the neutrons from sodium irradiated by deuterons. Emulsion thickness 200 microns.

gamma-ray follows the 2.76-Mev gamma-ray. In the various proton scattering experiments, weak proton groups have appeared which correspond to levels between 2.0 Mev and 2.8 Mev. However, for reasons of intensity, these levels may be related to Mg^{25} or Mg^{26}. Separated magnesium isotopes have not as yet been employed in scattering experiments. The data of the present experiment are completely unambiguous, because Na^{23} is the single stable isotope of sodium. It is, of course, likely that other neutron groups may emerge at different angles of observation and different bombarding energies. The nuclear energy levels of Mg^{24} as determined by several different methods are summarized in Table I.

TABLE I. Nuclear energy levels of Mg^{24}.

Neutron scattering	Proton scattering Rochester, 1941	Proton scattering Rochester, 1943	Proton scattering Princeton, 1948	Disintegration of Na^{24}	$Na^{23}+D\rightarrow Mg^{24}+n'+Q$
			1.00		0.83
1.30		1.32	1.33		1.24
	1.37			1.38	
			1.54, 1.58		1.66
			1.98(?)		
	2.80	2.74	2.64(?)		
		3.88	3.97		
	4.07		4.17	4.14	4.16
			5.51		
			7.32		7.70
			8.30		8.64

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Erratum: On the Difficulty of the Meson Theory of Nuclear Forces

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FOR Eq. (1) read

$$W_{BA}=-\Sigma_l H'_{Bl}H'_{lA}/(E_l-E_A). \quad (1)$$

Decay Scheme of Te^{125m}

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A STUDY of Te^{125m} (58 days) with a 180° magnetic beta-ray spectrograph[1] had shown that besides the K, L and M conversion lines of the 109.3 kev transition, a weak line of 31 kev electrons was present. With a more intense source of Te^{125m}, Hill[2] succeeded recently in photographing a second weak line, thus identifying the first and the second line as L and M conversion electrons, respectively, of a 35.4 kev transition.

The present investigation was undertaken to decide the role of this transition in the decay scheme of Te^{125m} in order to be able to assign the spin change between the metastable state and the ground state which is of particular interest in this case.[3]

We have carried out the following experiments:

1. By the fluorescence method previously described[4] we have detected unconverted photons corresponding to the 35.4 kev transition. We observed characteristic fluorescence from reflectors made of various iodine compounds, but not from reflectors made of caesium or barium compounds. This is to be expected for a 35.4 kev photon. A comparison of the intensity of the fluorescence from iodine with that obtained from silver, where the Te K x-ray lines are critically absorbed, showed that approximately 15 unconverted gamma-rays are emitted per 100 K x-rays. This result was confirmed by Mr. Katz by means of critical absorption instead of fluorescence.[5]

2. Using two krypton filled Eck and Krebs counters and a coincidence circuit with a resolving time of 0.2 microseconds, we found photon-photon coincidences which were strongly reduced by insertion of Ag absorbers between the source and one of the counters. This result taken together with the fact that no line corresponding to the difference 109.3 kev−35.4 kev=73.9 kev has been observed either converted or unconverted, indicates that the 35.4 kev transition succeeds the 109.3 kev transition.

An estimate of the K shell conversion coefficient can be made from the photon-photon coincidence rate observed. The absolute efficiency for K x-rays of the region in which we are interested was obtained by using a Te^{121} source, where K electron capture from the 17 day ground state leads to an excited state of 610 kev in Sb^{121} which decays promptly to the ground state.[6] If it is assumed that each 610 kev gamma-ray is preceded by K electron capture (thus ignoring small contributions from capture of electrons in higher orbits), the absolute efficiency ϵ for detecting K shell holes (equal to the efficiency of detecting K x-rays multiplied with the fluorescence yield) is obtained. If we further assume that the unconverted gamma-ray is detected by our Kr counter approximately as efficiently as a K hole and that the fractions η_{K_1} of the 109.3 kev radiation and η_{K_2} of the 35.4 kev radiation are converted in the K shell, the following relation holds:

$$A=\frac{\eta_{K_1}\times\dfrac{N_{12}}{N_1}}{2\eta_{K_1}\epsilon-\dfrac{N_{12}}{N_1}}.$$

Where A denotes $(\eta_{K_2}+\gamma_2)$, γ_2 being the fraction of unconverted gamma-rays per 35.4 kev transition and N_{12}/N_1 the number of coincidences per single count for the Te^{125m} source measured in a geometry identical to that used for the determination of ϵ. For η_{K_1} we used the previously determined value 0.54[1]. Our coincidence experiments yielded the following values:

$$\epsilon=(1.1\pm0.1)\times10^{-3}$$

$$\frac{N_{12}}{N_1}=(0.8\pm0.1)\times10^{-3}$$

from which it follows that A is close to 1.