a current regulated magnet with 8-in. pole faces operating near 1500 gauss and the others with a battery operated magnet with 10-in. pole faces operating near 1900 gauss. The ratios of the resonance frequencies in the same field were found to be

$$\nu(\mathrm{Tl}^{203})/\nu(\mathrm{H}^1)=0.5714\pm0.0001,$$
$$\nu(\mathrm{Tl}^{205})/\nu(\mathrm{H}^1)=0.5770\pm0.0001,$$
$$\nu(\mathrm{Tl}^{203})/\nu(\mathrm{Tl}^{205})=0.9903\pm0.0002.$$

This result for Tl^{205} agrees within experimental errors with that given by Poss in a previous letter.[3] He did not make precise measurements on the Tl^{203} resonance because of a low signal-to-noise ratio but stated that for the same frequency its resonance could be found at a field one percent lower than that required for Tl^{205}. In the present experiment the signal-to-noise ratio for the Tl^{203} resonance was about ten, and thus allowed a considerably more accurate location of the resonance frequency.

The magnetic moments of the nuclei of both thallium isotopes were found to be positive, and their integrated resonance amplitudes were each consistent with a spin of $\frac{1}{2}$, as given by spectroscopic data.[4] If the magnetic moment of the proton is taken to be $(2.7928\pm0.0008)\mu_N$[5] and a correction for electronic diamagnetism is made,[6] which for this computation has been assigned an error of 15 percent, then

$$\mu(\mathrm{Tl}^{203})=(1.614\pm0.003)\mu_N,$$
$$\mu(\mathrm{Tl}^{205})=(1.629\pm0.003)\mu_N.$$

The ratio $\mu(\mathrm{Tl}^{203})/\mu(\mathrm{Tl}^{205})=0.9903\pm0.0002$ is, of course, much more accurately known.[7]

[*] Assisted by the Joint Program of the ONR and the AEC.
[1] R. V. Pound, Phys. Rev. **72**, 527 (1947).
[2] Note Eq. (40b) in the paper by F. Bloch, Phys. Rev. **70**, 460 (1946).
[3] H. L. Poss, Phys. Rev. **72**, 637 (1947).
[4] H. Schüler and J. E. Keyston, Zeits. f. Physik **70**, 1 (1931); H. Schüler and T. Schmidt, Zeits. f. Physik **104**, 468 (1937).
[5] This value differs from the value (2.7896±0.0008) given by S. Millman and P. Kusch, Phys. Rev. **60**, 91 (1941), by the correction for the magnetic moment of the electron $[1+(\alpha/2\pi)]$ suggested by J. Schwinger, Phys. Rev. **73**, 416 (1941).
[6] W. E. Lamb, Jr., Phys. Rev. **60**, 817 (1941).
[7] Upon completion of this work, our attention was drawn to more recent results by Poss, reported in the Quarterly Progress Report of the Research Laboratory of Electronics, Massachusetts Institute of Technology, July 15, 1948, p. 32. The results given above are in substantial agreement with those of Poss.

H^3 and the Mass of the Neutrino

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LAST year Konopinski[1] pointed out that, on the basis of data available at that time concerning the half-life[2] and maximum beta-ray energy[3] of tritium, the value of $|M|^2ft$ for H^3 was roughly 1/10 as large as for He^6, if zero neutrino rest mass was assumed. To remove this discrepancy with beta-decay theory, which predicts the same order of magnitude of $|M|^2ft$ for allowed transitions in all nuclei, Konopinski found it necessary to take the neutrino rest mass to be a few percent of that of the electron.

We should like to point out that more recent work on the half-life of tritium[4] and on its beta-spectrum[5] gives results which appear to remove the above-mentioned discrepancy with a zero neutrino mass. If one takes the upper limit of the tritium spectrum[5] to be 17 kev, one finds[6] for a zero neutrino mass, taking into account the Coulomb field, $f=2.2\times10^{-6}$. With a half-life[4] $t=12$ years and with $|M|^2=3$, this gives $|M|^2ft=2500$ sec., which is of the same order of magnitude as the value 5760 sec. given by Konopinski[1] for He^6.

This result is in agreement with the conclusions of several workers[5,7] concerning the neutrino mass based on the shapes of beta-energy distribution curves near their upper limits.

[1] E. J. Konopinski, Phys. Rev. **72**, 518 (1947).
[2] R. J. Watts and D. Williams, Phys. Rev. **70**, 640 (1946).
[3] R. D. O'Neal and M. Goldhaber, Phys. Rev. **58**, 574 (1940).
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[5] S. C. Curran, J. Angus, and A. L. Cockcroft, Nature **162**, 302 (1948).
[6] E. J. Konopinski, Rev. Mod. Phys. **15**, 209 (1943).
[7] C. S. Cook, L. M. Langer, and H. C. Price, Jr., Phys. Rev. **73**, 1395 (1948).

γ-Radiation from Au^{198}

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SEVERAL papers[1] have lately been published in this journal regarding the γ-radiation following the β-disintegration of Au^{198}. We have made a careful study of the γ-radiation in order to be able to find any γ-radiation besides the well-known γ-ray at 411 kev. The investigation was performed with our new double focusing spectrometer ($\rho=50$ cm) (in course of publication). The resolving power of the spectrometer was set to 0.8 percent and the lead converter used was only 3.7μ thick in order to make full use of the resolving power of the instrument itself. The results are shown in Fig. 1. The Compton distribution, the K, L, and M photo-lines of the 411-kev γ-ray, is clearly seen. Levy and Greuling[2] have reported γ-rays of 157 and 207 kev with an intensity of ≤ 15 percent of the 411-kev ray. We have paid special attention to the region 800–1250 $H\rho$, where the K photo-lines of these rays should be

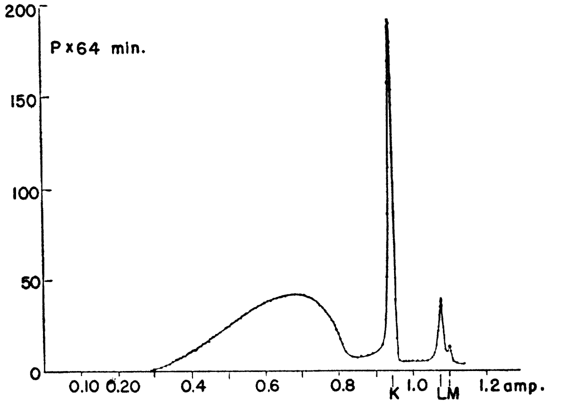

FIG. 1. Secondary electron spectrum, Au^{198}.