showed that the 36-kev conversion electrons, i.e. the 40-kev γ-ray, are not in coincidence with either of the two β-components. This shows that the 40-kev γ-ray is emitted by a metastable level.

From the β-spectrum, the K to $(L+M)$ conversion ratio for the 40-kev γ-ray is found to be 0.20 ± 0.04. Comparison of this value with theoretical values is postponed as the present formulas do not predict exact values for such a low energy γ-ray. In the case of the 498-kev γ-ray (N_e/N_β) is found to be about one percent. Comparing this rough value with Rose's tables[10] it is found that it is consistent with a 2^2 or perhaps 2^3 pole electric or magnetic transition.

A decay scheme, taking the observed facts into consideration, is suggested in Fig. 2. A discussion of the spin and parity assignments of the levels as well as the shape of the Fermi plots will be given in a detailed paper, to appear in Arkiv för Fysik. As an infinitely thin source can be obtained using an isotope separator, such a separation is being planned so that a more reliable value for (N_K/N_L) in the case of the 40-kev γ-ray can be given. The term scheme suggested in Fig. 2 is based on the nuclear shell theories given by Mayer[11] and Feenberg.[12]

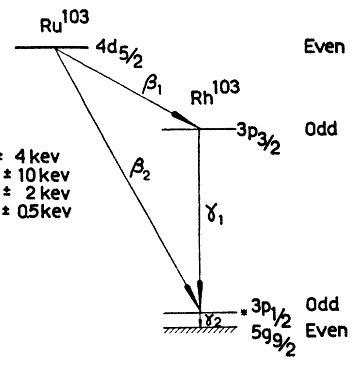

FIG. 2. Proposed decay scheme of Ru[103].

I wish to convey my sincere thanks to Professor Manne Siegbahn, the director of this institute. My thanks are also due Dr. Kai Siegbahn, for constant encouragement and supervision, and Fil. Mag. W. Forsling for making the chemical purifications.

[1] J. J. Livingood, Phys. Rev. 50, 425 (1936).
[2] Sullivan, Sleight, and Gladrow, Phys. Rev. 70, 778 (1946).
[3] E. Bohr and N. Hole, Arkiv Mat. Astron. Fysik 32A, No. 15 (1945).
[4] C. E. Mandeville and E. Shapiro, Phys. Rev. 77, 439 (1950).
[5] N. Hole, Arkiv Mat. Astron. Fysik 36A, No. 2 (1948).
[6] My thanks are due to Dr. Seligman for this irradiation.
[7] K. Siegbahn, Phil. Mag. 37, 162 (1946).
[8] H. Slätis and K. Siegbahn, Arkiv f. Fysik 1, No. 17 (1949).
[9] H. F. Gunlock and M. L. Pool, Phys. Rev. 74, 1264 (1948).
[10] Rose, Goerzel, Spinard, Harr, and Strong, private communication; Phys. Rev. 76, 184 (1949).
[11] M. G. Mayer, Phys. Rev. 78, 16 (1950).
[12] E. Feenberg and K. C. Hammack, Phys. Rev. 75, 1877 (1949).

Temperature Variation of the Compressibility of Molten Sodium

T. E. POCHAPSKY AND S. L. QUIMBY
Columbia University, New York, New York
June 29, 1950

A MODIFICATION of the standard pulse method for the measurement of sound velocity[1] permits the measurement of the temperature coefficient of this quantity for molten sodium with an accuracy better than one percent. Pulses of 12.2 Mc longitudinal waves of 1 μsec. duration are initiated by a quartz crystal at one end of a fused quartz bar 30 cm long. A coaxial fused quartz reflecting disk is attached by quartz rods 5 cm distant from the other end of the bar, and the two are immersed in sodium melted in a vacuum furnace. Pulses reflected from the end of the bar and from the reflector are observed on a Dumont type 256D oscilloscope. An electrical time delay between the initiation of the pulse and of the oscilloscope sweep eliminates the transit time in the quartz bar and permits the use of the expanded scale of the oscilloscope, thereby enhancing the accuracy of measurement of the sound velocity.

TABLE I. Adiabatic compressibility of molten sodium.

T°C	$\mu\times10^{12}$ cm²/dyne
97.6	16.69
100	16.71
120	16.95
140	17.19
160	17.43
180	17.68
200	17.93
220	18.19
240	18.45
260	18.71
272	18.87

The modification consists in the superposition, on the oscilloscope screen, of pulses received from the specimen upon others initiated simultaneously and transmitted in a carefully thermostated column of mercury the length of which is varied by means of a fine micrometer screw. Proper adjustment of this length annihilates the resultant pulse, and observation of the change in length required to maintain this condition affords the aforementioned accurate measure of the change in the sound velocity in the specimen.

Measurements made on singly and triply distilled sodium are indistinguishable. The velocity of sound at the melting point (97.6°C) is found to be $252{,}600\pm500$ cm/sec., and the temperature coefficient between this and 272°C, which is constant, to be -52.4 ± 0.3 cm/sec.-deg. Values of the adiabatic compressibility, μ, of the material computed with these data and those of Rinck[2] on the density of molten sodium are given in Table I.

A complete report of these experiments will be submitted for publication later.

[1] H. B. Huntington, Phys. Rev. 72, 321 (1947).
[2] E. Rinck, Ann. Chim. Phys. 18, 395 (1932).

Scattering of Positrons and Electrons by Nuclei*

H. J. LIPKIN AND M. G. WHITE
Palmer Physical Laboratory, Princeton University, Princeton, New Jersey
June 30, 1950

ACCORDING to relativistic quantum mechanics[1,2] there is a marked difference between the nuclear scattering of positrons and of electrons because of the manner in which spin-orbit coupling enters into the calculation. A comparison of the scattering of electrons and positrons by light and heavy nuclei is thus a check on relativistic quantum mechanics and on the spin of the positron. For small atomic number both classical and quantum-mechanical theories agree in predicting a scattering cross section which is practically independent of sign, but for $Z/137\approx1$ the calculations of various authors[2,3] show that at 57.6° a platinum foil should scatter electrons of 1.52 Mev kinetic energy nearly three times as strongly as positrons. Experimental work[4,5] thus far tends to confirm these predictions but suffers from rather large statistical errors.

An accurate experiment to check these calculations has been carried out using electrons from 300 mc of Ce^{144} and positrons from 30.0 mc of Ga^{66}. Scattering foils were 0.015 in. of polystyrene, 0.00068 in. of copper and 0.0001 in. of platinum. Source and scatterer were placed inside a solenoidal type β-spectrograph at the conjugate foci for 0.7–1.3-Mev particles. Particles scattered down the axis of the solenoid were analyzed by a second magnetic field before detection by a thin window G-M counter in order to select only the elastically scattered particles. These particles,