in mercury, the isotopes at masses 196 and 199. Since the 199 is 110 times as abundant as the 196 most of the neutron absorption in normal mercury is due to the isotope of mass 199.

TABLE I. Isotopic composition of neutron irradiated mercury.

Mass No.	% Abundance normal	% Abundance bombarded	Net change	Isotopic cross sections in 10^{-24} cm^2	Contribution to total section in 10^{-24} cm^2
196	0.155	0.120	-0.035 ± 0.002	3100	4.8
197	<0.001	<0.001	—	—	—
198	10.12	10.17	$+0.05\pm0.05$	—	—
199	17.01	13.78	-3.23 ± 0.07	2500	425
200	23.21	26.52	$+3.31\pm0.03$	<60	<15
201	13.15	13.11	-0.04 ± 0.07	<60	<8
202	29.66	29.63	-0.03 ± 0.15	<60	<18
203	<0.001	trace	+trace	—	—
204	6.69	6.68	-0.01 ± 0.03	<60	<4
205	<0.001	<0.001	—	—	—

In the cases of the isotope of mass 198, 200, 201, 202, and 204 it was possible only to assign upper limits to the cross sections. The upper limits in the Table I were deduced by assuming only $(n-\gamma)$ reactions. There are some indications at masses 199 and 201, however, that reactions other than $(n-\gamma)$'s took place; in particular $(n-2n)$'s. The occurrence of such a reaction in this sample was possible since there was a considerable flux of fast neutrons in the pile. A much heavier flux, or a different flux distribution, would be necessary to prove this point.

No peak was detected at mass 197 so that all the mercury 197 formed by $(n-\gamma)$ reaction on mercury 196 decayed by K capture to gold 197. Thus 35 micrograms of gold were formed from the 100 milligrams of mercury.

The weak peak at mass 203 was probably caused by a long-lived $(n-\gamma)$ induced activity in mercury as it was not observed in the normal sample. This is probably the 51-day β-activity known to exist in mercury.[2]

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Fine Structure of H_α

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THE fine structure of H_α has been again examined with a Lummer plate and with a Fabry Pérot étalon. The source was a hydrogen discharge tube submerged in liquid air. Trials were made under various conditions of pressure and current density. The separation of the apparent doublet resulted in an average value of 0.310 ± 0.007 cm^{-1}. The results relative to a particular series of spectra have been examined with great care and compared with the results of Dirac's theory. The apparent doublet has been reconstructed by assigning to every theoretical component an intensity curve $\exp[-k(\nu-\nu_0)^2]$ and to k a value derived from the experimental curve.

The "reconstructed" doublet differs from the experimental one in regard to the intensities and to the distance between the two maxima, which for the "reconstructed" doublet has a value of 0.327 cm^{-1}. We have tried to establish whether these disagreements may be ascribed only to the fact that the experimental intensities of the components are not exactly in agreement with the values calculated by Dirac's theory. In order to fit well the reconstructed doublet to the experimental one without changing the separations of the components, we should triple the intensity of the third component, keeping for the others about the theoretical intensities. But such a change of intensity, affecting almost exclusively the third component, would disagree with Sommerfeld's and Unsöld's[1] suggestion according to which the deviations from the theoretical intensities are due to the fact that the 2S level is metastable.

The observed deviations of the separation between the two maxima of the experimental and reconstructed doublet can certainly not be attributed to the overlapping of lines of the molecular spectrum, as Drinkwater, Richardson, and Williams[2] suppose, because the intensity of the molecular spectrum near H_α under our experimental conditions was practically zero.

If in the experimental measurements a mysterious systematic error does not occur, we should conclude, in accord with C. R. Williams' observations,[3] that the separations between the components do not correspond exactly to the calculated ones on the basis of Dirac's theory. As Sommerfeld[4] has shown, using Dirac's theory also, the deviations from the coulombian field in the neighborhood of the nucleus cannot explain the deviation observed by C. R. Williams. However, it is not certain that the formalism of the quantum mechanics maintains its validity for problems involving distances of the order of the nuclear radius. Therefore, we may hope that, when a suitable formalism is found, the small observed deviations may be justified.

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A Microwave Spectrograph*

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WE have constructed a microwave spectrograph of the wave-guide absorption cell type[1] which appears to be somewhat more sensitive than others which have been described. The basic principle is the use of a radiofrequency Stark effect field[2] which modulates the absorption by the gas so that a radio receiver can be used for detection purposes. The apparatus consists of the usual 2K33 K-band klystron oscillator tube, attenuator, a $5\frac{1}{2}$-foot length of K-band wave guide, and a crystal detector, the output of which goes to a narrow-band communication receiver. The amplified output of the receiver is displayed on an oscilloscope screen. The wave guide is fitted with a central electrode insulated from the walls in the form of a brass strip inserted parallel to the broad sides of the wave guide[3] and is made gas-tight with mica windows. An oscillator supplies