TABLE I.

| NEUTRONS | BR (1) | BR (2) |
|---|---|---|
| Fast (Rn+Be) | $\sigma=0.9\times10^{-27}$ cm$^2$ | $\sigma=0.6\times10^{-27}$ cm$^2$ |
| Thermal (Cd group) | $\sigma=1.2\times10^{-27}$ cm$^2$ | $\sigma=0.9\times10^{-27}$ cm$^2$ |

We believe that the mass number to be attributed to Br (1) is 84. Indeed, according to our experiments it is unlikely that Br (1) and Br (2) are isomers. On the other hand, Snell[4] has found in the bromine fraction separated from rubidium irradiated by fast neutrons (Li+D) two periods of 35 min. and 34 hr. The second period has to be attributed to $Br^{82}$, resulting from the reaction $Rb^{85}$ $(n, \alpha)$ $Br^{82}$. The fact that the first of the Snell periods agrees with the period of Br (1) suggests that we have to do with the same body, probably $Br^{84}$ which could result, in Snell's experiments, from the reaction $Rb^{87}$ $(n, \alpha)$ $Br^{84}$.

We have determined the cross sections for the production of Br (1) and Br (2) by thermal neutrons (cadmium group) and fast (Rn+Be) neutrons. All of the factors entering into this evaluation (yield of the chemical methods, absorption of the radiation, etc.) have been determined experimentally.

These results show that the radioactive bromine isotopes are produced in a very small proportion (at most 1 percent) during uranium fission due to neutrons.

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## Temperature Dependence of the Periodic Deviations from the Schottky Line

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IN recent communications[1,2] it was stated that a disagreement exists between the data of Seifert and Phipps[3] and of Turnbull and Phipps[4] on the one hand and those of Nottingham[1] on the other hand regarding the temperature dependence of the amplitudes of the periodic deviations from the Schottky line. The amplitudes were defined as the sum of the ordinate of a maximum and a neighboring minimum with the Schottky line as a reference.

In view of the great importance of the temperature dependence for the theory of the periodic deviations a reexamination of the original data of Nottingham has been made in the light of the theory,[2] which was missing when Nottingham wrote his letter. This re-examination shows that Nottingham's data are not inconsistent with the theory, according to which the amplitudes should be inversely proportional to the absolute temperature; however, these data alone are not sufficient to establish quantitatively the theoretical dependence, because of the superposition of "patch-effects." As pointed out already[2] the data of Phipps and collaborators agree with the theoretical temperature dependence of the amplitudes.

Finally, it seems worth while to point out that the magnitudes of the amplitudes of the deviations obtained by Phipps and collaborators agree closely with those obtained by Nottingham in spite of the considerable difference in the nature of the surfaces of the filaments used. Nottingham's amplitudes are about 10–15 percent higher than those of Phipps and collaborators, thus yielding an even better agreement with theory, which, when the current penetrating the potential barrier at the metal surface is considered,[5] yields amplitudes somewhat larger than those observed by Phipps *et al.* The remarkably close agreement between the locations of the maxima and minima found by Phipps *et al.* and those found by Nottingham already has been pointed out by Nottingham.[1]

In order to calculate the positions of the maxima and minima from theory, an assumption about $n$, the number of free electrons per atom of the emitting metal, must be made. With $n=1$ for tungsten, the calculated positions were found[2] to differ somewhat from the observed positions. If it is assumed that this difference is due principally to the fact that $n$ is really less than one for tungsten, then the observed positions may be used to estimate the value of $n$. A calculation based on this assumption indicates an upper limit of $n=0.35$ for tungsten. From the magnitude of the double layer necessary to yield the observed dependence of the work function of tungsten upon its different crystal faces, Smoluchowski[6] obtained[7] $n=0.33$ in agreement with the above value.

We are indebted to Dr. Nottingham for putting his original unpublished data at our disposal and for friendly discussions.

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## Positive Excess in Mesotron Spectrum

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SEVERAL years ago Rossi[1] and Mott-Smith[2] tried to observe the deflection of cosmic particles in a magnetic field by a system of two coincident counters with magnetized iron plates interposed. The effects observed, if at all real, were small and pointed to the existence of positive particles.

Later this method was superseded by the more powerful technique of the Wilson chamber, and it became clear that

TABLE I. *Counting rates for various magnetic fields.* (Coinc./hr.)

| INDUCTION IN GAUSS | AT ROME (50 m.s.l.) ARRANG. I | ARRANG. II | AT CERVINIA (3460 m.s.l.) ARRANG. I | ARRANG. II |
|---|---|---|---|---|
| 2400 | 81.1±1.2 | 77.7±1.2 | 162±2.1 | 160±2.1 |
| 5000 | 83.1±1.2 | 77.2±1.1 | 165±2.5 | 157±2.5 |
| 10,400 | 88.5±0.9 | 80.5±0.8 | 175±2.1 | 159.5±2.0 |
| 15,500 | 97.5±1.0 | 84.7±0.9 | 206±1.8 | 176±2.0 |
| 17,000 | 103.3±1.5 | 91.2±1.3 | 217±2.7 | 184.8±2.9 |