94 were vertical in the case of a weak polonium activity *ceteris paribus*. Thus the cosmic radiation is to be regarded as the cause of these rays.

Two thicker but very short tracks (0·6 cm. range) were observed, horizontal, but with both ends in the chamber, very similar to N-atoms set in motion by neutrons. They too must be due to cosmic radiation.

As to the nature and process of origination (whether directly or indirectly due to cosmic radiation) nothing can be said so far.

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Rock Salt Absorption of Cosmic Rays

COSMIC ray absorption measurements have until recently been carried out with relatively few light elements and compounds. Rock salt mines being very often used in the determination of the residual ionisation, it seemed especially interesting to measure the absorption of cosmic rays by this mineral.

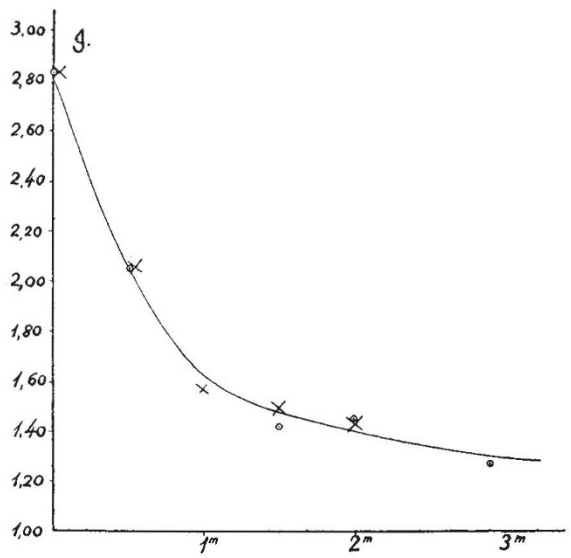

FIG. 1.

Powdered rock salt was used for this research. In one set of experiments, about 40 tons of this material was heaped above the apparatus, which was contained in a wooden box. Care was taken to create conditions analogous to those existing for experiments in water; hence great extension of the external surface was aimed at. In a second set of experiments a kind of salt hill or mound was available to the author. The results of the measurements are shown in Fig. 1, where the observations made within the mound are marked by circles. A Kolhörster apparatus made by Messrs. Günther and Tegetmeyer, of Braunschweig, was used.

On computing the results by means of the $e^{-\mu x}$ function, I find for the coefficient μ/ρ at the depth of 1–3 metres a value of $0{\cdot}7 \times 10^{-4}$ cm.^{2} gm.$^{-1}$, which is many times lower than the corresponding value, namely, $3{\cdot}6 \times 10^{-4}$ cm.^{2} gm.$^{-1}$, for water. Thus, rock salt seems to be the most transparent substance for cosmic rays yet examined. The detailed data concerning this work will be published in the *Acta Physica Polonica*.

I take this occasion to express my thanks to the management of the Solvay Industrial Establishments in Poland, which provided the best conditions for the realisation of this investigation at the rock salt mines of Wapno (Province of Poznań).

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Fermi's Element 93

WE have recently pointed out[1] that element 93 should have, according to the Periodic Law, other properties than those displayed by Fermi's element 93[2], and we found, on repeating his experiments with protactinium, that his 13-minute product from uranium is chemically identical with element 91.

The Italian workers, in continuation of their interesting work on neutron bombardment, have just described[3] a new reaction of their element with an atomic number above 92 (co-precipitation with rhenium sulphide), and also found that their product with a period of 90–100 minutes is isotopic with the 13-minute body.

We have studied the rhenium sulphide reaction with protactinium as an indicator, and found that element 91 is precipitated to the extent of 40–60 per cent together with rhenium sulphide from 15 per cent hydrochloric acid solution, exactly like Fermi's products. Our conclusion is therefore that, instead of Fermi's assumption of

$$93 \xrightarrow{\beta} 94 \text{ (or perhaps } 94 \xrightarrow{\beta} 95),$$

the products with 13- and 90–100-minute periods are isotopes of ekatantalum, changing by β-emission into isotopes of uranium.

Fermi's proof of the non-identity of his products with element 91, based on experiments with brevium, is not conclusive, because we have to expect the freshly formed brevium atoms to be, at least to some extent, in a chemically different state (for example, tervalent ions) than the bulk of the much longer-lived atoms of 'element 93'.

Details of our experiments will be published elsewhere.

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Oct. 12.

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[2] E. Fermi, NATURE, **133**, 898, May 17, 1934.
[3] E. Fermi, E. Amaldi, O. d'Agostino, F. Rasetti and E. Segrè, *Proc. Roy. Soc.*, A., **146**, 495; 1934.

Experiments on Supraconductors

IN a previous letter[1] it was reported that the magnetic induction in tin spheres, which were cooled in an external magnetic field until they became supraconductive, did not vanish entirely, but that part of the magnetic flux remained in the body. This 'freezing in' of lines of force was observed, when supraconductivity was attained either by cooling the specimen in a constant magnetic field or by decreasing the external field at constant temperature. Since then, this result has been confirmed by magnetic experiments by Rjabinin and Shubnikow[2] and by calorimetric measurements by Keesom and Kok[3].

Meanwhile, two of us (T. C. K. and K. M.) have