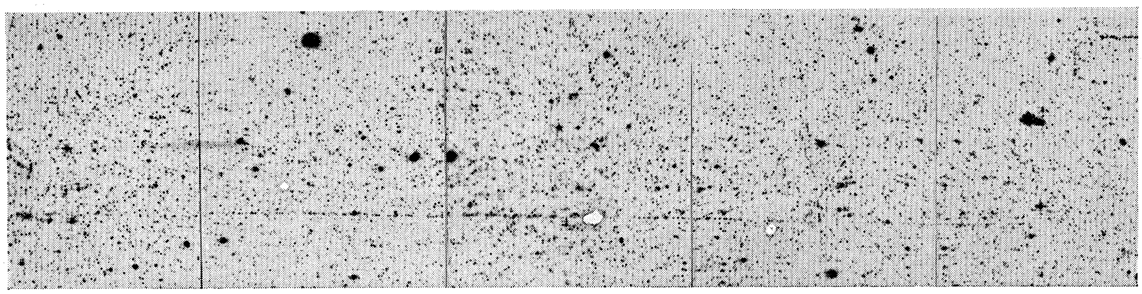

FIG. 1.

## Direct Photographic Tracks of Atomic Cosmic-Ray Corpuscles

Within the last year or two there has been general agreement that at least to a very considerable extent the cosmic rays entering the upper regions of our atmosphere are very high speed particles. Anderson and Neddermeyer[1] have recently reported proton tracks secured in a cloud chamber at the top of Pike's Peak and Herzog and Scherrer[2] have similarly secured a track in a cloud chamber on the Jungfrau in the Swiss Alps. The latter workers gave the length of the track as 18 cm and its energy equivalent as 45 MEV.

Fig. 1 shows the track of a particle in a special photographic emulsion sent up on the recent National Geographic-United States Army Stratosphere Flight. The length of the track in the emulsion is approximately 350 grains and the energy absorbed in the emulsion approximately 100 million electron volts. Part-way along the path there is apparent the track of an ejected particle which is presumably a proton. The main track is interpreted as being due to an alpha-particle on the basis of the comparative response of this emulsion to protons and alpha-rays. The stereoscope shows that the main track is well imbedded in the emulsion and that the track of the ejected particle rises quite steeply and comes out at the surface. A simple tool is provided by this technique for the study of cosmic rays at high altitudes.

T. R. WILKINS
H. ST. HELENS

University of Rochester,
Rochester, New York,
February 6, 1936.

[1] Presented at the meeting of the American Physical Society, St. Louis, January 2, 1936.
[2] Herzog and Scherrer, Ann. de physique 4, 489 (1935).

---

## X-Ray Diffraction by a Film of Counted Molecular Layers

Dr. Irving Langmuir and Dr. Katharine Blodgett have kindly given us one of their films of multiple layers of barium stearate, from which we have been studying x-ray diffraction. Our film, prepared by Dr. Blodgett, has 301 molecular layers deposited on glass. According to Dr. Blodgett,[1] alternate layers of molecules reverse directions, thus bringing the heads of the molecules in adjacent layers together to form a reflecting plane. The grating space is thus the thickness of two molecular layers. She measured this distance by optical means and found it to be approximately 48.8A.

The photographs of Fig. 1 show several of the *L* and *M* lines of tungsten obtained by using this artificial crystal in a vacuum spectrograph, arranged for Bragg focusing. The first three orders of the *L* series are shown on the same plate, different times of exposure being given to the different orders. The relative intensities of the first, second and third orders are found to be 100 : 28 : 31, respectively. The lines are found to be not quite as sharp as those obtained from a gypsum crystal, but in the case of the *M* line, almost as sharp as theoretically possible from the limited number of molecular layers.

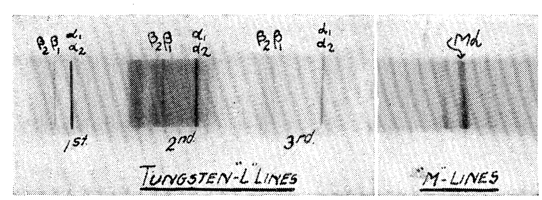


FIG. 1.

It is evident that the use of such a film, with a known number of layers and a known distance between the reflecting planes, may serve as an accurate method of measuring the absolute wave-length of x-rays, and hence of Avogadro's number and the charge on the electron. An experimental study is also made possible of the dependence of widths of x-ray lines upon the number of cooperating layers.

We wish to thank Professor A. H. Compton and Dr. Elmer Dershem for calling these possibilities to our attention.

CLIFFORD HOLLEY
SEYMOUR BERNSTEIN

Ryerson Physical Laboratory,
University of Chicago,
February 15, 1936.

[1] Katharine B. Blodgett, J. Am. Chem. Soc. 57, 1007 (1935).

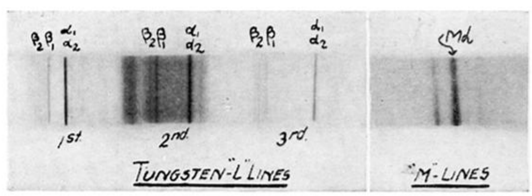


FIG. 1.