these measurements was found to be 3.1×10^{10} dynes/cm^2 while the value for the modulus computed from the velocity measurements in the electrostatic method gave 5.1×10^{10} dynes/cm^2 at 24.3°C. When this value is corrected for temperature, it is in fair agreement with values just published by Rinehart.[6]

These differences in the velocities come apparently from the fact that under a high stress, a cold flow occurs.[7] Froman[3] has shown an increase in Young's modulus at small stresses for metals. The authors expect to continue measurements at small loads and make a complete report later.

[1] Louis R. Weber and Frank P. Goeder, J. Colo.-Wyo. Acad. (1939).
[2] E. Gruneisen, Ann. d. Physik 22, 801 (1907).
[3] D. K. Froman, Phys. Rev. 35, 264 (1930).
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Diurnal Variation of Extensive Showers

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Registrations of the number of extensive showers have been made at sea level (Paris) with a set of two unshielded coincidence counters, separated by a horizontal distance of three meters. The counts were automatically recorded every hour during a period of two and a half months, from January to April, 1940. The results are given on the curves of Fig. 1, the mean number of counts per

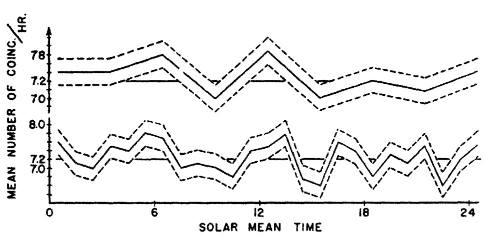

FIG. 1. Mean number of counts per hr. *vs.* solar mean time.

hour being plotted against the mean solar time. In the upper curve the means have been taken over periods of three hours. The dotted curve indicates the probable errors. All readings were corrected for barometric effect.

There is only a feeble maximum (6 percent) at noon, in agreement with the results of Kolhorster. This maximum may be due to a thermal effect. The particles responsible for the production of the big air showers, because of their high energy, are probably completely insensitive to the magnetic field of the earth and of the sun. These particles should then have an isotropic space distribution outside of the solar system. So, either the sources of the particles or the fields in which they are accelerated are uniformly distributed around us, or there must exist very strong causes of disturbance which scatter the initial directions of the particles before they reach the atmosphere.

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Single Scattering of Fast Electrons

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Elastic scattering of fast electrons (Ra B+C) by the nuclei of nitrogen, fluorine and argon is investigated with a cloud chamber (magnetic field = 450 oersteds). The length and curvature of the tracks were measured by means of stereoscopic projection. In order to avoid large errors in the determination of the energy, scattered tracks shorter than 2 cm were disregarded. Corrections were made for this and for the finite depth of the illuminated area (1 cm) in the cloud chamber.

For comparison with the Mott theory, the whole energy-range was subdivided into three groups (0.2–0.5; 0.5–1; 1–3 Mev). For each of these energy-groups angular cells were formed with the limits 15°, 20°, 30°, 45°, 60°, 90°, 180°. The total amount of scattering seems to be somewhat higher than theoretically expected. (See Table I.)

TABLE I.

Nucleus	Length of path	Number of collisions	$n_{\text{exp}}/n_{\text{th}}$
A	708 m	153 (>20°)	1.5
F	910 m	113 (>15°)	1.2
N	515 m	42 (>15°)	1.3

The scattering cross section as a function of energy and angle is in agreement with theoretical predictions within the limit of statistical errors. The anomalies reported for the scattering by nitrogen[1] are not confirmed. The values of the cross sections for argon and nitrogen agree well with those of Randels, Chao, and Crane.[2]

There are no measurements available to compare with our results for fluorine.

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Some Discharge Characteristics of Self-Quenching Counters

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January 2, 1942

In a previous publication[1] it was shown that the counter discharge mechanism proposed by C. G. Montgomery and D. D. Montgomery[2] satisfactorily explains the dependence of pulse size upon counter wire capacity and counter length for a non-self-quenching gas mixture. Similar studies made with a self-quenching gas provide equally satisfactory agreement and illustrate nicely the essential difference between the two types of counter operation. As anticipated the self-quenching mixture provides no mechanism for insuring a constant pulse size (for varying capacity and length) and the total voltage swing of the wire for a given cylinder potential is simply $l\alpha/c$. Here l is the effective counter length, c is the total capacity of the wire system and α is the charge per unit length in