figure, which gives photometer curves for two of the spectrograms. Only one of these curves shows the red line.

Thus the average intensity of the red line 6300 relative to that of the green one was very small indeed throughout these auroral displays. Not only the red O_I -triplet, but also the red bands of the first positive group of nitrogen were relatively very weak.

As a result of the weakness of the red part of the spectrum, the auroras appeared green or bluish. The small intensity of the red triplet is very interesting when seen in connexion with the fact that we are just at a sunspot maximum, and it will be of great interest to see whether this small intensity of the red triplet is maintained throughout this winter and during the next few years. If that is the case, it would mean that the intensity of the red triplet suddenly drops when the sunspot frequency has reached its maximum, and that consequently the agency which is effective in producing the enhancement of the red O_I -triplet is not directly connected with the sunspots, but with some other solar phenomenon such as flocculae or prominences or with some kind of active matter carried to high solar levels as the result of solar activity.

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² Vegard, L., *Geofys. Publ.*, **9**, No. 11 (1932).

³ Vegard, L., *Z. Phys.*, **106**, 108 (1937).

⁴ Vegard, L., *NATURE*, **141**, 200 (1938).

⁵ Vegard, L., *Geofys. Publ.*, **12**, No. 5 (1938).

Scattered Reflections of Radio Waves from a Height of more than 1,000 km.

BESIDES the two main divisions of the ionosphere, the E - and F -layers, at heights of 120 km. and 250 km., more or less irregularly occurring reflecting layers have been observed. Magnetic storms and auroras are usually accompanied by an increase of

Fig. 1.

SCATTERED REFLECTIONS, 850-1200 KM. EQUIVALENT HEIGHT. RECORDED JULY 7, 1938, 18H. 0M.-18H. 5M., M.E.T. ON 7.65 Mc./SEC.

Fig. 2.

SCATTERED REFLECTIONS, 1300-1600 KM. EQUIVALENT HEIGHT. RECORDED JULY 9, 1938, 16H. 45M.-16H. 50M., M.E.T. ON 9.0 Mc./SEC.

the height of the F -layer. F -layers with an equivalent height of 400-500 km. are often observed during and after magnetic storms.

During recent months, experiments with a pulse transmitter with considerable output have been made using frequencies which were higher than the critical penetrating frequencies of the F -layer, the latter being controlled and recorded by a second set consisting of a receiver and a transmitter of moderate output. The output of the larger transmitter was more than 50 kw. in the pulse, the aerial used was a horizontal half-wave dipole, the distance between the transmitter and the receiver was 150 m.

On a number of afternoons and evenings, scattered reflections from a region lying between 850 km. and 1,600 km. equivalent height were recorded. Fig. 1 is a record showing scattered reflections between 850 km. and 1,200 km. equivalent height, and Fig. 2 shows scattered reflections with 1,300 km. to 1,600 km. equivalent heights. On the latter figure, the white line indicates a ground-wave 180° out of phase with the pulse emitted. Since a 50-cycle circuit was used for the oscillograph, this indicates a time difference of 1/100 sec., which corresponds to an equivalent height of 1,500 km. The echoes observed on the oscillograph screen are faint and the amplitudes rapidly varying. They seem to be similar to the scattered reflections from the 100 km. level recently described by Eckersley¹ and Appleton², and an explanation of these high echoes as due to ionospheric clouds seems to be probable.

A detailed study of the appearance of these high echoes will be published elsewhere.

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¹ *NATURE*, **140**, 846 (1937).

² *Proc. Roy. Soc.*, **164**, 467-476 (1938).

The Electron Neutron Interaction

RECENTLY, we described the results of experiments which led us to the conclusion that electrons are emitted from atoms when they interact with fast neutrons by some hitherto unknown process¹. On the other hand, Kallmann and Kuhn² have shown