

Physics. — *A temporary excess of ten percent in the cosmic radiation.*
By J. CLAY, E. M. BRUINS, J. T. WIERSMA.

(Communicated at the meeting of June 27, 1936).

In the period of the last few months while our most used instruments were in operation in the coal-mine of Kerkrade we had arranged two recording instruments in Amsterdam. Both had ionisation chambers of 40 liter, filled with argon of 40 atm., shielded by 110 cm. of iron on all sides. Each of the chambers was connected with an electrometer triode. The method of recording was the same as described in a previous publication¹⁾, however a new experimental arrangement enabled us to take the records of both instruments simultaneously with the same microammeter. The first instrument I was ready early in May and had given constant readings during about three weeks when the second was placed by its side on May 15. This second instrument was hardly in working order when both apparatus gave a sudden increase of several per cent. It was first thought that both instruments were at fault because the variation was so large. Therefore instrument I was tested again on May 27 and 28 and the other on May 28, but no fault could be found. The records of the ionisation chambers I and II are shown in fig. 1, curves I and II. The measurements with apparatus I had to be interrupted on June on account of irregularities in the connection to the condensor for the compensation.

The suspicion that the effect might be real received further support when on June 6 one of us (WIERSMA) reported that his three fold counter system, with which he was measuring the absorption coefficient of the soft primaries, had gone up on May 21 by 10 % without his being able to detect a fault in the apparatus. Before May 21 the apparatus had remained fairly constant, and on June 6 it showed a tendency to come back to this original value.

The few counter observations without absorber for the period May 20 to June 9 are also shown in fig. 1 by III, where the double arrows indicate the accuracy.

At the bottom of fig. 1 the barometer record is given. We see that the barometer had changed but very little during the period in question. There is only a slight drop on May 30 which seems to correspond to an increase in the ionisation and the coincidences as might be expected.

Further it is remarkable that all of the three instruments have a decrease from 24—27 May. Also there seems to be a small decrease previous to

¹⁾ J. CLAY, Phys. 1, 363 (1934).

Volts on cond.

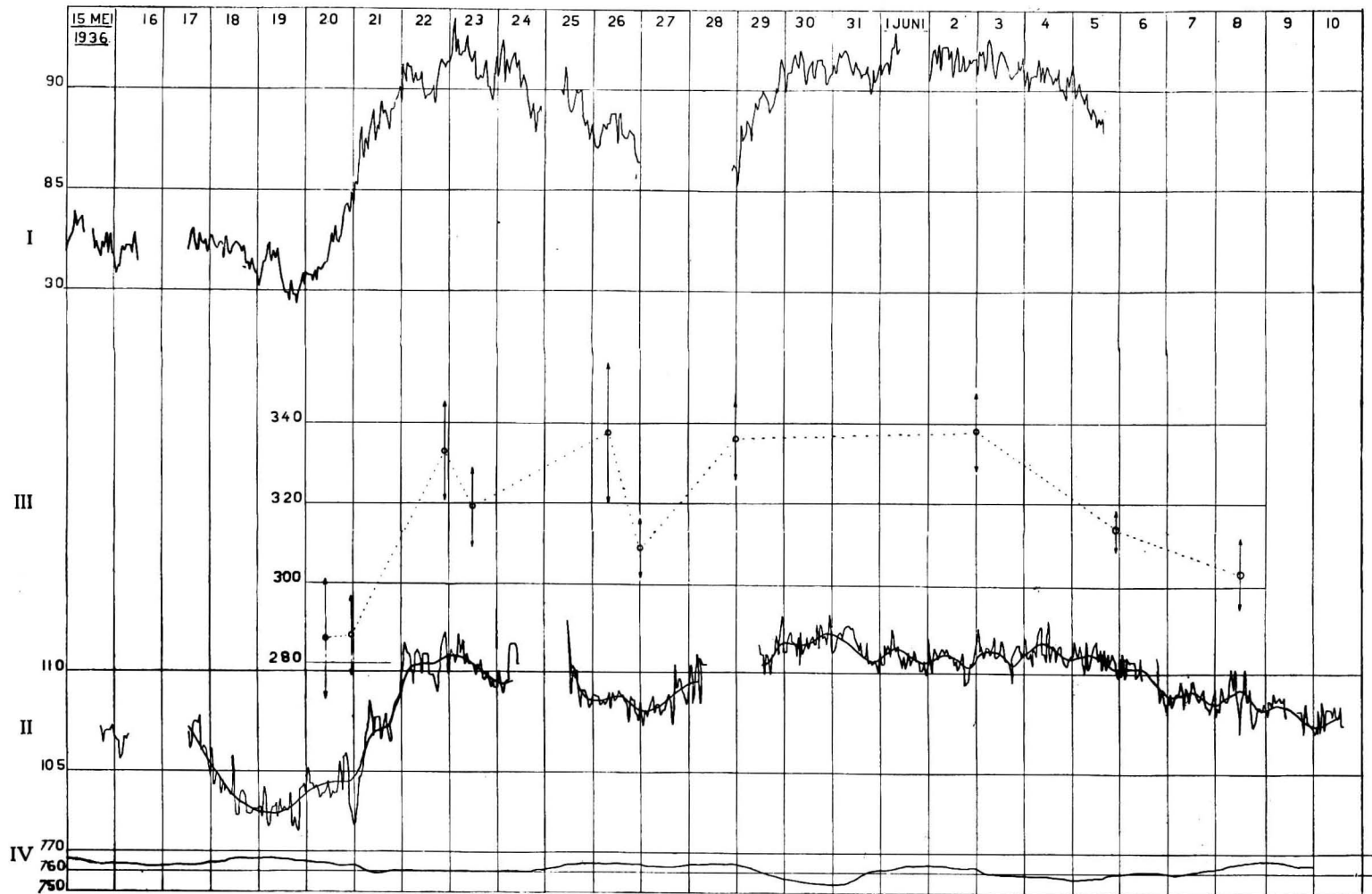


Fig. 1.

I and II. Records of the ionisation by cosmic rays.

III. Counter readings.

IV. Barometer.

May 21, which might be understood if on the days before May 18 a slight excess over the normal value had preceded the main excess, but this is only a suggestion.

It seems certain that in both the records I and II there is a small diurnal variation of about 0.8 % with a maximum at about 10^h in the morning and a minimum at 22^h. The temperature in the room was nearly constant, but moreover a temperature influence on ionisation chambers was often tried out, but never found to be present. This influence is possible on the counters, since there were large temperature variations during these days. The accuracy of the individual readings for the ionisation measurements is 0.1 %, and the accidental variations are observable in the graph. In the mean they are 0.5 %.

We think it possible that the radiation has its origin in a fixed point of the heavens, but then it is necessary that this origin is not far from the pole, because the diurnal variation is small. It may be that we are presented with an effect of the electron part of the radiation of a super-nova according to the hypothesis BAADE and ZWICKY ²⁾).

The effect of eventual proton radiation from a super nova recently discussed by H. ZANSTRA ³⁾ would not make itself felt at the earth's surface, unless the super-nova is one in our own galaxy. This possibility must be excluded, since such a super-nova should have been extremely bright and certainly would have been found by the astronomers. Moreover the observed increase of cosmic ray intensity is much too sudden to be ascribable to protons, which should show a considerable time lag as compared with the light-rays and electrons.

The effect must await confirmation by other observers before it can be considered established with certainty.

²⁾ W. BAADE and F. ZWICKY, Proc. nat. Acad. Si 20, 254 (1934).

³⁾ H. ZANSTRA, Physica 3, July 1936.

Note by the correction. The values of the recording ionisation chamber and of the counters have come back to those on 19 Mai, so that we have no reason till yet to doubt the reality of the variation. The daily variation of 0.8 % is disappeared.