The transmutation of potassium permits derivation of the mass difference between ^{40}K and ^{40}Ca . We have assumed that potassium has the mass given by the expected position (marked by the first cross in Fig. 1): the value for ^{40}Ca then lies as shown by the second cross.

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Variation of Cosmic Ray Intensity with Height in the Atmosphere

THE well-known curves of cosmic ray intensity obtained by Kolhörster, Regener and others show no trace of discontinuity, for they are mean values for intervals of many hundreds or even thousands of metres.

G. A. Suckstorff¹ made measurements every 100–130 m. in a slowly ascending balloon, using a Kolhörster apparatus. He found a discontinuous curve, the discontinuities being especially great in higher regions of the troposphere between 7,000 m. and 9,700 m., the deviations amounting to ± 30 I. It has been suggested by Suckstorff that the irregularities may be accounted for by the existence of radioactive substances in the higher layers of the atmosphere.

FIG. 1. Cosmic ray intensity. I: Kolhörster's measurements. II and III: curves obtained by Suckstorff. IV: curves obtained by Ziemecki and Narkiewicz-Jodko (only a few points are marked).

In order to examine the question more closely, we undertook similar observations. On March 29, an ascent was made in a free balloon (*Warszawa II*,

2,200 cu. m.) which reached the height of 10,800 m. During the slow ascent of the balloon between 6,600 m. and 10,000 m. measurements of ionisation were made. Our results give a smooth curve, the deviations from it in no case exceeding 5 per cent, and being in general less than 2 per cent (Fig. 1).

We used an ionisation chamber of approximately 1 litre capacity, filled with argon at a pressure of 15 atm., and connected with a Lindemann electrometer. The sensitivity of the electrometer was approximately 0.01 volt per division. Thus, individual measurements did not last more than 40 sec. The batteries were kept at constant temperature by means of a constant temperature jacket.

We think the discontinuities observed by G. A. Suckstorff were due to the irregularity of the movement of the electrometer thread, the Kolhörster apparatus not being sensitive enough for measurements of short duration.

We hope to be able to repeat our observations. Experimental details will be published in *Bulletin Acad. Polon.* We take this opportunity of expressing our thanks to the Department of Aeronautics of the Ministry of War, and especially to Capt. Z. Burzynski, who piloted the balloon.

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The 1X -level of the Hydrogen Molecule

As a result of the analysis of the near infra-red spectra of H_2 , HD and D_2 , some new facts have been discovered concerning the so-called 1X -level of the hydrogen molecule which remove many of the uncertainties and difficulties in the interpretation of this level.

The analysis of the $^1X \rightarrow 2p^1\Sigma$ systems of HD and D_2 showed quite clearly that the vibrational quantum numbers of the 1X -level given by Richardson¹ (but considered doubtful by him) must be raised by one.

The $0 \rightarrow 0$ bands of all three molecules were then discovered in the region near 11,200 Å. The rest of the band system is distributed chiefly through the near infra-red. For H_2 , my analysis agrees with that of Richardson for the principal lines, but there are several deviations. The $1 \rightarrow 0$ band for which Richardson gives only two lines is a strong, well-developed and fairly regular band.

The $V = 0$ level of 1X is quite regular without any trace of perturbations or decoupling. The effective moments of inertia are 0.871 , 1.156 and 1.725×10^{-40} for H_2 , HD and D_2 respectively, and the effective internuclear distance is 1.019×10^{-8} cm.

The $V = 1$ level shows a very faint perturbation, and the higher levels are strongly perturbed. The perturbations are of the same nature