An examination of the statistics of the problem shows that if in an appreciable fraction of ionic spurts, say 20 percent as observed, the counters also record, then the number of rays is probably not considerably less than what would correspond to an average of one ray through each counter set. Taking into account the average distances involved, we are led to the conclusion that the nuclear disintegrations observed corresponded to at least 100 secondaries, and may of course represent many more. The possibility of there being more secondaries than would correspond to the total number of electrons and protons in the disintegrated atom naturally raises interesting considerations regarding the mechanism of the processes accompanying the disintegration.

W. F. G. SWANN
C. G. MONTGOMERY

Bartol Research Foundation of
The Franklin Institute,
Swarthmore, Pennsylvania,
June 1, 1933.

Scattering of Molecular Rays in Gases

Knauer[1] has recently investigated the scattering of molecular rays in gases. By the aid of high speed pumps the author has found it possible to produce a more intense beam so that scattering might be investigated with higher resolving power.

A beam is formed by three successive slits and the distribution of the scattered molecules or atoms studied by the aid of a Pirani gauge. Two slits placed before the gauge permit molecules to enter it only when they are scattered from a definite position in the beam.

Fig. 1 (curves A and B) shows the scattering curves which have been obtained for hydrogen molecules and helium atoms. The temperature of the source of the beam and scattering chamber was 20°C. The scattered intensity is expressed in arbitrary units, being simply the galvanometer deflection multiplied by $\sin\theta$ to correct for the variation in the length of the beam from which scattered molecules may enter the gauge.

Massey and Mohr[2] have computed the scattered intensity for helium atoms having a relative kinetic energy corresponding to 20°C and −185°C. The results which they have obtained offer a qualitative explanation of the helium scattering curve. Curve C (Fig. 1) is reproduced from their article after being multiplied by $\sin 2\theta$ and divided by $\sin\theta$ to obtain the scattering per unit solid angle in a coordinate system in which one atom is initially at rest. One peak occurs at 25° and another at 40°. From a qualitative point of view three effects are immediately obvious which would tend to merge these two peaks into the one observed at 30°. The first is the finite resolving power of the apparatus, second the Maxwellian distribution of velocities in the beam and third the fact that the scattering molecules are not at rest but are moving in random directions with a Maxwellian distribution of velocities.

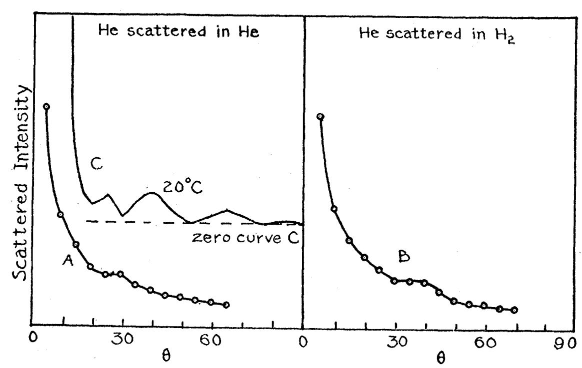

FIG. 1. Curve A, He scattered in He; curve B, H_2 scattered in H_2; curve C, results of Massey and Mohr for He scattered in He.

The intensity of the region of 65° is too small to determine definitely whether a peak exists there.

A complete report will appear in a short time.

R. M. ZABEL*

Massachusetts Institute of Technology,
June 3, 1933.

* National Research Fellow

[1] Knauer, Zeits. f. Physik **80**, 80 (1933).

[2] Massey and Mohr, Nature **130**, 277 (1932).

On the Production of the Positive Electron

The experimental discovery of the positive electron gives us a striking confirmation of Dirac's theory of the electron, and of his most recent attempts to give a consistent interpretation of the formalism of that theory. As is well known, and quite apart from the difficulties connected with the existence and stability of the electron itself, the theory in its original form led to very grave difficulties in all problems involving lengths of the order of the Compton wavelength, in that it predicted the occurrence of electrons of negative kinetic energy, in gross conflict with experience. Dirac has pointed out that we might obtain a consistent theory by assuming that it is only the absence of electrons of negative kinetic energy that has a physical meaning; in this way one could avoid the occurrence of the critical transitions, and yet understand the validity of many correct predictions of the theory, such as the formula for the relativistic fine structure, and the Thomson and Klein-Nishina scattering formulae: only the physical interpretation of the formulism was changed, and involved in many cases the appearance pairs of electrons and "antielectrons"