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II.

Apparate zum Nachweis von Korpuskeln und Quanten

Recent progress in ionization chambers technique

by **Emilio Segrè**

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The ionization chamber as an instrument of nuclear research is one of the earliest and most used but although over 50 years old, significant advances in its technique have been made during the last few years. The improvement of the electric systems for measuring potentials with fast amplifiers, has made it possible to study the time dependent details of ionization pulses and not only their integral effect.

In order to take advantage of these possibilities offered by the electrical part of the apparatus it is necessary to use electron collection which is much faster than heavy ion collection. The motion of electrons in a gas is discussed and measurements of the drift velocity of electrons in several pure gases (Argon, Hydrogen, CO_2 , BF_3) are presented. The motion of electrons in mixtures of Argon and Carbon dioxide is then also discussed, with special reference to the increase in drift velocity obtainable by the use of mixtures. Data on the attachment of electrons to impurities, notably O_2 and water are also presented.

In the case of electron collection special designs of the ionization chamber are necessary to obtain proportionality between voltage pulse and ionization. This problem has been solved either by the use of additional grid electrodes in the chamber or by special geometrical construction of the same.

Finally several types of ionization chambers for special purposes are illustrated. Among them:

1. a high precision differential chamber for half life measurements;
2. a differential chamber to detect fission pulses, while the beam of a cyclotron goes through the chamber;
3. high energy neutron monitor chamber, using fission of bismuth;
4. a special spiral chamber to monitor slow neutrons by fission;
5. a chamber suitable for a precise analysis of alpha pulses;
6. medical chambers for the protection of workers.

The greatest part of the subject of this report is taken from B. Rossi and H. STAUB — Ionization chambers and counters-Experimental Techniques — McGRAW-HILL 1949.

This book was published after the report was given and for this reason reference is made to it and more detailed report on the subject is not presented here.