FISSION SPECTRUM

1. PROBLEM AND METHOD

The neutrons emitted in consequence of the fission of U_{25} have been studied by various investigators. Zinn and Szilard[1] have recorded the proton and α recoils in an ionization chamber. Proton recoils from fission neutrons have also been observed by Chadwick[2] in a photographic emulsion and by Bennett and Richards[3] in a Wilson cloud chamber. A rough determination of their energy has furthermore been obtained by Christy and Manley[4] from the absorption coefficient in water. The results of Chadwick give a distribution with the maximum at 2 MV and a half width of about 1.3 MV. The absorption data yield an "effective" energy of 2.2 MV and the tracks observed in the cloud chamber originally seemed to indicate a considerable number of neutrons even above 4.5 MV.

The object of the present investigation was to redetermine the energy distribution of the fission neutrons of U_{25}, making use of the cyclotron as an abundant source of primary neutrons. This has the obvious advantage over the methods previously applied to obtain good statistics within short running times and to avoid the cumbersome geometrical sacrifices necessitated by low intensities. On the other hand, because of the great number of primary neutrons from the cyclotron target with energies in the same range as those of the secondary fission neutrons to be observed, a rather intricate arrangement and method of recording had to be devised.

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1) Phys. Rev. 56, 619, 1939.
2) Report B-86
3) CP-325
4) CP-209