RECENT DEVELOPMENTS IN PHOTOELECTRICITY

By Professor C. E. MENDENHALL
UNIVERSITY OF WISCONSIN

The general quantum theory may be said to have been born of a black body and sired by the photoelectric effect. Consequently, since we are all, willy-nilly, quantists, every one has at least a genealogical interest in photoelectricity. For some, this interest is enhanced by a certain fascination of the phenomenon itself, and just at present the relation of experiment to statistical and wave-mechanical theory is attracting particular attention. While it is my purpose to discuss mainly recent aspects of the subject, though with no attempt at completeness, it will be useful for the sake of clarity to restate very briefly certain of the earlier generalizations, in order that the later material may be placed in proper relation to them.

The term photoelectricity covers what are, from the standpoint of technique at least, two distinct fields, the "external" and "internal" effects, the latter being sometimes more descriptively called "photo-conductivity," and it is with the former only that we shall be concerned. Furthermore, the "external effect" itself involves two sets of phenomena, which are experimentally and theoretically quite distinct, according as the matter from which electrons are being removed is in the one case a vapor or in the other case a solid or liquid.

The case of a vapor is obviously the simplest, but it has been the last to be developed because of experimental difficulties. The Bohr theory led one to expect that if the energy of the light quantum equalled or exceeded the ionization energy of the atom, or molecule, ionization would result, and experiments of Williamson, Lawrence and others have verified this and given values of the ionization potential consistent with other determinations. On account of the difficulty of working with sufficiently short wave-lengths,