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THE NEW DIVISION OF ELECTRON AND ION OPTICS IN THE AMERICAN PHYSICAL SOCIETY

THE natural tendency of any growing science is to subdivide itself. The special topics developed at first by a few become the occupations of many workers, who find their respective specialties becoming so rich in knowledge and opportunity as to claim a steadily rising fraction of their energy and time. One of the duties of a scientific society is to combat this tendency and to maintain the unity of its science as long as possible. This may seem a singular introduction to the statement that the American Physical Society, which for nearly fifty years has subsisted as a single body, has now commenced to organize a Division of Electron and Ion Optics.

Paradoxical as it may sound, this step is regarded by the officers and the Council of the Society as a step in the direction of unity and not in that of disintegration. The policy is not to deny the trend towards specialization but to keep the inevitable subdivisions within the framework of the Society so that those who specialize in them may continue to hold their meetings and their publications (to some extent at least) in common, and may continue to regard themselves and to be regarded as being physicists and members of a society of physicists. This policy is closely allied with that of increasing the part which industrial and applied physicists take in the meetings and other activities of the Physical Society: an important matter, now that the proportion of physicists engaged in industry and in the "borderline fields" is rapidly rising.

The opportunity for forming divisions within the American Physical Society was given several years ago by an amendment to the Constitution of the Society. Advantage has now been taken of it, owing in the main to the initiative of L. Marton of Stanford University, who undertook the requisite preliminary step of formulating a petition to the Council and winning the signatures of numerous members. The Division of Electron and Ion Optics is now in process of organization, and will probably make its debut as sponsor of a special program at one of the general meetings of the Society to be held during the coming winter and spring.

The following statement of the scope and object of the Division of Electron and Ion Optics has been prepared mainly by Dr. Marton.

"Electron and Ion Optics" is a relatively recent branch of physics. Some of its fundamental facts were known for a considerable time before its name was coined; but its proper history commences only with the last ten or fifteen years. During this recent period the optical analogies, existing between the behavior of a beam of light passing through refracting media and that of a beam of electrons passing through suitably shaped electric or magnetic fields, have been clearly recognized. The discovery that electrons and ions can be focussed by radially symmetrical fields, that images can be produced by such fields and that the action of any field can be described in terms of geometrical optics, was startlingly new. Such optical analogies helped in the better understanding of earlier observations, but much more

than this, they started a very rapid development in a number of fields. Already electron and ion optics comprises theoretical, experimental and applied branches. The task of the theoretical physicists is to calculate the path of electrons or ions in electric or magnetic fields, to calculate new combinations with reduced aberration, to develop the theory of such effects which enter into the operation of electron or ion optical devices (such as, for instance, electron and ion scattering, diffraction, etc.). On the experimental side we can quote the investigation of electron or ion optical systems, the observation and measurement of the aberrations, and the design and practical realization of suitable fields. The work of the experimental electron optician toward newer and better systems very often overlaps with some problem of applied electron or ion optics.

The products of applied electron and ion optics are very manifold. A few of them have been widely publicized, such as the electron microscope, the cyclotron and other apparatus of transmutation, many kinds of radio tubes and television apparatus. Other less widely publicized instruments are, however, very important in physical or other research; among these are mass spectrographs, cathode ray tubes and oscillographs, and electron diffraction apparatus. All such instruments have in common the characteristic that in them electrons or ions are accelerated, and the paths of these are modified by means of electric or magnetic fields in such a way that some kind of "focussing" of the beam is achieved, thus justifying the name "optics."

The field of the newly formed Division of Electron and Ion Optics of the American Physical Society is defined to comprise all theories and all apparatus involving the forming, directing, shaping and focussing of beams of electrons and ions. This definition is intended to make clear that the Division is not restricted to any special applications (such as, for instance, electron microscopy alone). Presumably the intention has been realized, as nearly five hundred members of the Society have already enrolled as members of the Division. Though the scope of the Division is thus carefully defined, it is not intended in the least to exclude any member of the Society who is interested enough to join; and nothing will preclude anyone who has joined this Division from joining any others which may later be formed. It should be stressed, also, that the function of the new Division is not a duplication of that of any already existing Society devoted to a special field of applied electron optics, but a grouping of those who are interested in the physics of electron-optical and ion-optical apparatus.

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