

translation for citing all German works by their French titles. LESTER F. WARD.

WASHINGTON, D. C.

*Light Waves and Their Uses.* By A. A. MICHELSON. Decennial Publications of the University of Chicago. Second Series, Volume III. University of Chicago Press, 1903.

The 'uses' with which this book is concerned are altogether those with which the author's name is so intimately associated; that is, the applications of interference methods whereby light waves are made the tools and units of measurements for physical and astronomical investigation. The Michelson form of interferometer, which has tremendously increased the applicability of this method, was invented as a means of attack upon one important problem which is here treated briefly—the well-known Michelson-Morley ether-drift experiment—still the subject of study, both experimental and theoretical.

An introductory chapter on wave motion and the general phenomena of interference serves to prepare the reader for the development of the interferometer principle, by which is meant the use of a plane reflecting and transmitting (glass) surface to split a beam of light into two, which are subsequently recombined, to produce interference fringes. The quantity directly measured is either a movement or shift of these fringes, or a change in their distinctness or 'visibility,' produced by changes in the relative retardation of the two beams between the points of separation and recombination. By this means changes in the relative retardation, which may in a particular case be produced by changes in position of a plane reflecting surface, can be measured with extreme accuracy. Again, the change in relative retardation may be produced by changes in the index of refraction of the medium through which one beam passes, or motion of the medium, or by the introduction of transparent films—and the corresponding shift of the fringes affords an exceedingly accurate means of measuring these changes.

Some of the many special cases in which this method has been applied are dealt with in

succeeding chapters; for example, the measurement of angles and distances, the study of spectrum lines and close groups of lines, the effect of a magnetic field on light-emission, the determination of the angular magnitude and 'structure' of stars, and the fundamental, but less fascinating, matter of the use of light waves as standards of length—*i. e.*, the evaluation of the meter in terms of the wavelengths of the red, green and blue radiations of cadmium.

The book is avowedly popular, being a reprint of Lowell Institute lectures, and the lecture style is retained throughout; nevertheless, it is to be feared that without the aid of experimental demonstrations, for which the good illustrations are hardly an equivalent, the 'general reader' would be rather overtaxed by some of the chapters. However, from the other standpoint of the preface, the book as a résumé in untechnical form, of important researches which have occupied Professor Michelson for the past twenty years, will be of great value, not only to scientists who have not read the original papers, but to many who have.

C. E. M.

*Index to the Literature of the Spectroscope* (1887 to 1900, both inclusive). By ALFRED TUCKERMAN. Smithsonian Miscellaneous Collections, 1902.

This index forms a continuation of a previous volume by the same author, which dealt with the literature up to 1887, and continues the subject up to the time when the work was taken over by the International Committee for Indexing Scientific Literature. The first half of the book is taken up with the author index, alphabetically arranged, of which the chief characteristics should be accuracy and completeness. Concerning the former a short examination suffices to detect a fairly large number of misprints, mostly trivial, besides a few cases of confusion of names, and one erroneous reference. Again, while absolute completeness is too much to ask for, there are omissions here which do not seem based on a fair estimate of the relative importance of various papers.

The second half of the volume contains the