plete mathematical references are given in an appendix. The same is true of a number of other purely mathematical topics, such as complex integration, orthogonal functions, curvilinear coordinates, etc. A whole chapter is devoted to the study of hydrogen atoms by the wave mechanics method with sufficient concrete details and applications to make clear to the student the utility of the method.

The matrix mechanics is then introduced and developed as an independent theory, with detailed study of applications. This is followed by a discussion of the connection between the wave and matrix mechanics, and the method of constructing the quantum matrices from the solutions of the wave equation. In the chapter on the general theory of quantum dynamics, there is a thorough treatment of Heisenberg's indetermination principle, and the transformation theory of Jordan and Dirac. The frequent introduction of concrete illustrations greatly enhances the value of this chapter.

The book is concluded with chapters on the treatment of non-hydrogenic atoms and molecules by the new mechanics, spectral intensities and the diffraction of electrons and atoms by crystals.

The style of the book is in general clear and concise. The typography is excellent and the text is well illustrated by a large number of well-made diagrams. On the whole it is a work which may be heartily recommended to all those interested in the problems of atomic structure.

R. B. LINDSAY

Leçons sur les Ensembles Analytiques et leurs Applications. By Nicolas Lusin. With a preface by Henri Lebesgue and a note by Waclaw Sierpinski. Paris, Gauthier-Villars, 1930. xvi+328 pages.

This volume in the Borel series contains a systematic survey of the present knowledge of analytic sets, a knowledge which is chiefly due to the researches of the Russian mathematician who is the author of this book. In fact the only results which are not due to Lusin or his pupils come from members of the Polish school of Sierpinski and Mazurkiewicz. The analytic sets of Lusin, which are a generalization of Borel sets, have been briefly mentioned previously in several books (Hausdorff's *Mengenlehre*, for instance), but this is the first book devoted entirely to their study.

Lebesgue in his preface humorously points out that the origin of the problems considered by Lusin lies in an error made by Lebesgue himself in his 1905 memoir on functions representable analytically. Lebesgue stated there that the projection of a Borel set is always a Borel set. Lusin and his colleague Souslin constructed an example showing that this statement was false, thus discovering a new domain of point sets, a domain which includes as a proper part the domain of Borel sets. Lebesgue expresses his joy that he was inspired to commit such a fruitful error.

Of the five chapters of approximately equal length into which the book is divided, the first two are devoted to Borel sets. Here and throughout the book, Lusin considers as his fundamental domain the set of irrational points of a linear space. By excluding the rational points, certain simplifications in statements and proofs of theorems are obtained. After mentioning several different methods of defining Borel sets and showing their logical equivalence, a study is