

ruled surfaces are defined and described, the most attention being given to the cubic conoid. The intricate problems treated in this chapter are much simplified by the consistent use of the same method throughout; first an algebraic discussion, and then the graphical interpretation of the results obtained.

The last chapter contains a brief introduction to topological mapping, to the intersections of roofs, and to the principles of the Mercator map.

The press-work is good, and the proof-reading excellent. The book is not provided with an index.

VIRGIL SNYDER.

*Die Quantentheorie, ihr Ursprung und ihre Entwicklung.* By FRITZ REICHE. Berlin, Julius Springer, 1921. vi + 231 pages.

The theory of relativity and quantum theory are probably the greatest philosophical developments of modern physics. Both grew out of the failure of classical mechanics to give correct results when applied to radiant energy. Neither can be regarded as rigorously established on physical fact. Both are rather working hypotheses that have not been found inconsistent with fact. Of the two the theory of relativity is much more completely formulated. In fact there is in the minds of most physicists still considerable uncertainty as to just what quantum theory is, and concerning its cause views differ all the way from those of the extreme atomists, who consider radiant energy of a given frequency as capable of existing only in pieces of a certain size, to those of the older exponents of continuity, who still believe these curious results due to averaging. There is also the fascinating suggestion that we have here a consequence of sub-electronic structure and so have made a first step into the mysterious region beyond the electron. Because of all this uncertainty the subject has for the investigator an interest transcending that of more highly crystallized theories. For this reason we particularly welcome a book like that of Reiche which presents in simple form the theory and its principal applications.

The author disclaims any intention of writing a systematic textbook, yet he has produced as systematic a text as exists on the subject, and a very readable one. The first three chapters give Planck's hypothesis of energy quanta assumed in order to obtain a radiation formula agreeing with experiment, Einstein's hypothesis of light quanta with photo-electric application, and Planck and Sommerfeld's hypothesis of quanta of action. The remaining chapters treat the Einstein-Debye theory of specific heat of solids, the specific heat of gases, the Bohr type of atom with application to optical series, X-ray spectra, and some molecular models. The book should not be used as a substitute for Planck's *Heat Radiation* or Sommerfeld's magnificent *Atombau und Spektrallinien*, but as an introduction to the subject with which one may physically orient himself before taking up more complex discussions such as occur, for example, in the recent pamphlet of E. P. Adams published by the National Research Council.

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