fascinating border region between science and philosophy. Beginning with the celebrated statement of physical determinism by Laplace, the author traces the development of the causal idea in physics up to the time when the quantum mechanics began to render its previous strict interpretation doubtful. There is again a brief survey of the fundamental ideas of wave mechanics followed by a detailed description of the content of the Uncertainty Principle, leading to the viewpoint that all that the new mechanics determines from the solutions of its differential equations and their boundary conditions is the *probability* of future events. As long as one remains on the macroscopic level (large scale phenomena) this situation reduces for practical purposes to the classical causality. But on the microscopic level (small scale phenomena) the new view will, if adopted in its present form, affect profoundly the whole course of future physical theory. It is for this reason that the new conception should be widely discussed from every conceivable angle, and every attempt like that of de Broglie to present its essential ideas in simple form is extremely welcome.

R. B. LINDSAY

Funktionentheorie. By K. Knopp. Part I, fourth edition (Sammlung Göschen, vol. 668). Berlin and Leipzig, de Gruyter, 1930. 140 pp.

This is a new edition of the first of the author's two little volumes on the subject. Under the four heads Fundamental Notions, Integral Theorems, Series, and Singularities, its eleven chapters cover much of the groundwork of the theory. A surprising amount of material is compressed into its pages. Definitions are accurately given, and many brief illustrations are introduced to clarify essential ideas. About seventy theorems are proved. The proofs are stripped of excess verbiage, but there is no sacrifice of completeness or rigor. Despite the compactness of the style, or perhaps due to it, the proofs are quite readable. Because of its emphasis on the essentials of the theory, the book would be a useful companion to the regular text in the hands of the beginner.

L. R. FORD

Projektive Geometrie. By Dr. Ludwig Bieberbach. Leipzig-Berlin, Teubner, 1931. iv+190 pp. +45 fig.

This is volume 30 of Teubner's Mathematische Leitfäden and is a continuation of the author's treatise on analytic geometry which appeared in the same collection and which gives an analytic treatment of elementary projective geometry. It is not an axiomatic exposition of the subject, although the importance of axiomatic argumentation is emphasized and utilized. From the fact that Professor Bieberbach is a noted analyst it may be expected that the rigor of analytic reasoning is manifest throughout. See for example the proof on pages 53–57 that the functions $\rho x_i' = F_i(x_1, x_2, x_3)$, $(i=1, 2, 3)$, which transform lines into lines throughout the projective plane, are linear.

One welcome feature of the little treatise is the inclusion of some interesting propositions on the geometry of the triangle as features of metric specialization.

Altogether, Professor Bieberbach's *Projective Geometry* is an excellent introduction to the subject, as an analyst conceives it, and contains many valuable features.

ARNOLD EMCH