SHORTER NOTICES

The Expanding Universe. By Sir Arthur Eddington. New York, Macmillan, 1933. x+182 pp.

This volume, an enlarged version of a lecture delivered by Eddington at the meeting of the International Astronomical Union at Cambridge (Mass.) in Sept. 1932, treats the theory of the expanding universe, not as an end in itself, but as a means for determining the cosmical constant which appears in the Einstein theory. The subject lies at the meeting point of astronomy, relativity, and wave-mechanics. If the theory developed is valid, then (p. 170) "to measure the mass of an electron, a suitable procedure is to make astronomical observations of the distances and velocities of the spiral nebulae." This indicates the marked interest of the book for all those who delight to meditate on the interrelatedness of natural phenomena.

R. D. CARMICHAEL

Fourier'sche Reihen, mit Aufgaben. By J. Wolff. Groningen, P. Noordhoff, 1931. 60 pp.

This monograph, written in synoptic form, is an excellent condensation of material that is usually developed in many more pages. The choice of material is also commendable; the theorems selected are certainly among the most fundamental in the vast number of results concerning Fourier series available in classical and modern literature.

The book is divided into three sections, each accompanied by a valuable set of exercises. Many of the exercises, indeed, involve fundamental results in the theory of Fourier series which are sufficiently closely related to theorems in the text to justify having their development left to a student possessing initiative. The first two sections of the book can be read by those familiar only with the Riemann integral. The third section presupposes a knowledge of the theory of the Lebesgue integral.

Among results presented in the first section are criteria for convergence of the Fourier series for functions satisfying Lipschitz conditions, and functions which are monotonic, or of bounded variation, both in connection with convergence at a point and uniform convergence in an interval. There is also given an example of a continuous function whose Fourier series diverges at a point.

The second section contains a discussion of summability $(C\,1)$ of the Fourier series, the best approximation property, in the sense of least squares, of the Fourier partial sums, Fejér trigonometric polynomials, Parseval's theorem, some of Riemann's theory of trigonometric series in general, and some of Cantor's work on the uniqueness of Fourier developments. The Fourier integral is treated in the exercises.

The third section begins with the extension of classical results to Lebesgue integrable functions. Then, after certain properties of such functions are discussed, some of the recent results depending essentially on Lebesgue integration are obtained. There is a discussion of the convergence criteria due to de la Vallée Poussin, Lebesgue, and W. H. Young, and some of Fatou's results in