SHORTER NOTICES

Über die Darstellung von Gruppen in Galoisschen Feldern. By R. Brauer. (Actualités Scientifiques et Industrielles, No. 195.) Paris, Hermann, 1935. 15 pp.

A given finite group can be represented in a number of ways as a linear group. The number of distinct representations of this sort when the coefficients of the linear substitutions are complex numbers has been shown by Frobenius to be the same as the number of conjugate sets of elements of the group. The author considers the same question, requiring the coefficients of the linear substitutions to lie in the minimal algebraically closed field determined by $GF(p)$, where p is a prime. When p does not divide the order of the group Dickson has shown that the number of representations is the same as for the field of complex numbers. When p divides the order of G the author shows that the number of distinct representations is the same as the numbers of conjugate sets of operators which have orders prime to p.

In the second part of the paper the author considers the number of indecomposable (unzerfällbar) components of the regular representation of the group and shows it to be the same as the number determined above, making use of the conjoint of the given group.

H. R. BRAHANA

Theoretical Astrophysics. By S. Rosseland. Oxford, Clarendon Press, 1936. 19+355 pp.

In the words of its author, the aim of this remarkable book is to formulate a program of theoretical astrophysics. It "contains what may be called a bird's eye view of our knowledge of stellar atmospheres and envelopes, projected on to atomic physics as a background." A second volume, dealing with the internal structure of stars, is promised by the author.

Nearly one-third of the book is devoted to developing those phases of quantum mechanics which are of interest in astrophysics. Particular emphasis is placed on spectroscopy. Even this portion of the book, which serves merely as an introduction to the central theme, is distinguished by clarity of presentation and elegance of mathematical argument, so much so, indeed, that the physicist not primarily interested in what follows will feel attracted by the manner in which the material is put.

The next chapter deals with the transfer of radiation through absorbing and emitting media, a problem which calls for an interesting application of hydrodynamic theory. After this the author turns to an investigation of empirical data on profiles and total intensities of stellar absorption lines. His survey is everywhere careful and critical, pointing out discrepancies as well as the numerous sources of inaccuracy of the theories involved. The opacity of stellar atmospheres is interestingly explained as chiefly due to absorption by excited electrons with accompanying photoelectric effect. Splitting and broadening of spectral lines due to Zeeman and Stark effects are treated rather

briefly; the various types of broadening and shift which are due to intermolecular forces and which have been of interest in the terrestrial laboratory are not discussed, presumably because of their absence in stellar spectra.

Several chapters are then devoted to the chemical constitution, to the dissociative equilibrium of stellar compounds, and to the temperatures of the stars, with special reference to the sun. After this the discourse again turns toward spectroscopy, the subject being that of forbidden transitions. Near the end of the book we find a discussion of evidence regarding the state of nebulae, their degree of ionization, their temperature, their chemical composition.

Every reader will close the book with an acute realization of the power of analysis which has shed considerable light on these most elusive problems, and of the vastness of the field which still waits for investigation. A book by Rosseland on astrophysics needs no recommendation. It is highly suitable that it should have appeared in the International Series of Monographs on Physics, thus aligning itself with some of the most outstanding treatises on modern physics.

HENRY MARGENAU

Élemênts de gêométrie infinitêsimale. By G. Julia. Deuxième édition. Paris, Gauthier-Villars, 1936. 7+262 pp.

The second edition of Julia's differential geometry has entirely kept its original character. As such, it takes a very special position among the textbooks on the subject. In no other book are questions concerning contact and envelopes treated with so much elaboration and so much care. Not only does their discussion take more than a hundred pages of the first of the three chapters, but they also permeate many topics in later parts of the book. Great care is therefore taken in the application of the theory of implicit functions. In the new edition the author has here and there changed the order of the subjects, and added a few remarks, partly in footnotes, which have added to the clarity of an already very well written book.

D. J. STRUIK

Actualitês Scientifiques et Industrielles. Exposés mathématiques publiés à la mémoire de Jacques Herbrand. Paris, Hermann.

1. *Sur quelques propriêtês de polynomes.* By J. Dieudonné, 1934. 24 pp.
2. *Sur les suites stationnaires.* By N. Lusin, 1934. 19 pp.
3. *Étude des fonctions sousharmoniques au voisinage d'un point.* By Marcel Brelot, 1934. 55 pp.
4. *Charakterisierung des Spektrums eines Integral Operators.* By J. von Neumann, 1935. 20 pp.

1. The author develops an elementary method for determination of the radii of "starshapedness" and of "convexity" of some special classes of analytic functions and applies this theory to the case $z[P(z)]^{\alpha/n}$, where $P(z)$ is a polynomial of degree n and α is any real number.

2. Let (*) $E_0, E_1, \cdots, E_\alpha, \cdots, \alpha<\Omega$ be a transfinite sequence of Borel measurable sets, which is such that if α is a limit ordinal, then $E_\alpha=\lim_{\xi<\alpha} E_\xi$. The sequence (*) is said to be stationary if there exists a $\gamma<\Omega$ such that