chapter opens with a presentation of the experimental evidence, illustrated by tables and graphs; this is followed by detailed theoretical discussion, a comparison between theory and experiment, and an interpretation of the experimental results. An appendix on the statistical treatment of observations and auxiliary tables for the cascade theory computations will be useful to the research worker and student. The great compass of literature covered will make this compendium an invaluable help to anyone working in cosmic ray physics. It should be pointed out, however, that the student will have to make use of the original literature quoted, since so much is digested in the treatise that it is impossible to give detailed derivations for every formula.

It should be mentioned that, although the author addressed this book primarily to the specialist, he has followed it up with a small text for the general reader—*The frontiers of science series: cosmic rays and nuclear physics*—which will be useful to students as an introduction to the larger volume.

K. LARK-HOROVITZ

Purdue University

Vacuum tube amplifiers. (Massachusetts Institute of Technology Radiation Laboratory Series.) George E. Valley, Jr., and Henry Wallman. New York-London: McGraw-Hill, 1948. Pp. xvii + 743. (Illustrated.) $10.00.

This book, the 18th volume in the Radiation Laboratory series, discusses amplifier types that are used in radar systems, but are more generally applicable to the whole field of instrumentation, control, and special communication devices. It is recommended to engineers in these fields as a valuable reference and to others as a good introduction to the subject.

The introductory chapter treats the analysis of linear circuits by operational methods. Subsequent discussions cover video amplifiers; wide band, high frequency amplifiers; low frequency, band pass amplifiers; and direct-coupled amplifiers. In each case a theoretical analysis of pertinent circuitry is supplemented by a detailed exposition of design principles. Particular attention is directed to those factors affecting gain, band width, dynamic range, and fidelity of response. Much practical design advice is included. However, in some cases practical difficulties may not be sufficiently stressed. Inveterate optimists are warned against the suggestion (p. 193) that a stagger-tuned IF strip might be realized with only inductance tables, a soldering iron, and a pair of pliers. Final chapters cover the theory of amplifier noise, minimal noise design, and the measurement of amplifier noise.

The technical level of the discussion is uniformly high. The material presented is up to date and definitive of current design practice. Some of it has heretofore been available only in periodicals or in reports having limited circulation.

Excellent editing is apparent. The 14 chapters, separately written by 10 contributing authors, maintain very satisfactory continuity. Illustrations are plentiful and references adequate. The index appears too brief, but a detailed table of contents facilitates location of material.

J. G. REID, JR.

National Bureau of Standards

The face of the moon. Ralph B. Baldwin. Chicago: Univ. Chicago Press, 1949. Pp. xiv + 239. (Illustrated.) $5.00.

Over a period of several years, Dr. Baldwin has been studying the moon's surface particularly from photographs made at the great observatories, and his conclusions have been set forth and justified in his new book. His contention is that meteorite impact is solely responsible for all lunar features except the obvious blowholes that are lined up in curving rows in many regions of the moon. Lunar lava has altered many of the features thus produced by impact, but even the great Mare Imbrium, "tolerably circular," and 700 miles in diameter, is included as an impact explosion crater.

His too-rapid dismissal of slow igneous processes, in which he largely falls into the usual error of comparing lunar formations with present-day terrestrial volcanoes, will hardly serve to convince those who continue to wonder how craters 50 or even 100 miles in diameter can be only two or three miles deep, if formed by meteoritic bombardment. He discusses this problem in a chapter on "correlations," but somehow it doesn't quite convince. The violence of an impact explosion would have been so great that large craters, whose walls would be below the horizon for an observer at the center, could hardly have been formed. On a plane surface, perhaps it would be possible, but the moon's surface is too sharply curved.

But Dr. Baldwin's book is the only modern comprehensive championing of the impact hypothesis, which was advanced casually and intuitively in the past. No one has more intimately studied the lunar surface, with a view toward demonstrating the truth of the impact hypothesis, nor, for that matter, has anyone so completely discussed the terrestrial meteorite craters. In two chapters totaling 50 pages, Dr. Baldwin has given a very valuable description and discussion of the known and suspected impact craters on our own planet. It is somewhat amazing, however, to find him quoting, with a straight face, the weird "contraterrene" hallucination of La Paz, in connection with the great 1908 Siberian meteorite fall.

Other important sections of the book are his discussions of the lunar atmosphere and hypothetical lunar history during the period outlined by the theory of tidal evolution. This latter section is a very well thought out attempt to account for the obviously different ages of the lunar features.

It is a good and valuable book, and it does not matter that it will not convert many who now believe in an igneous origin of the lunar craters. Any discussion of the moon's features by someone as thorough as Dr.