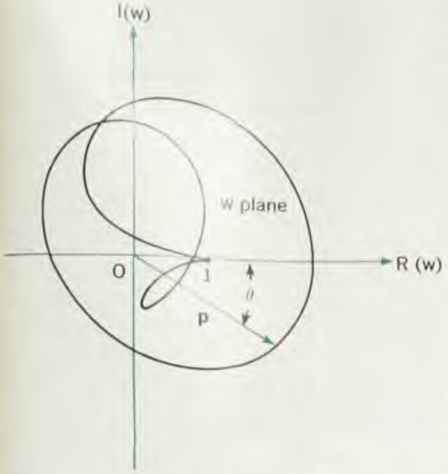

To illustrate the Nyquist criterion in plasma physics, Bernard Roos plots this path of λ in the complex λ-plane in his book reviewed below. λ is the wavelength of electron-density oscillations.

and interpretation" and to "develop the theory slowly and methodically." To many these will be laudable aims and I, myself, am no ardent admirer of the dry "theorem-lemma-proof-theorem" style of mathematical writing. In this day, however, any physicist wanting to master the material in the book will surely have had a fair exposure to mathematics. Such readers would appreciate, rather than fear, a few clearly identified and *stated* theorems (even though the proofs be only heuristic). But no theorems with conditions are properly stated; few equations are even labelled. (Of the four hundred odd equations displayed in the chapter on distributions only 13 elementary properties of the delta function are numbered: 1 to 8 and 1 to 5.) This exceptionally informal style makes the book hard to use for reference or even for systematic self-study. With no way of referring tersely to previous results the style becomes turgid and repetitive. For example: the Heisenberg delta function $\delta + (x)$ is defined at least four times, namely on pages 297, 312, 320 and 329.

These defects are regrettable because the author is not sloppy mathematically. The arguments are developed carefully and subtle points are mostly quite well explained. At certain times of enlightenment one is even prepared to forgive Roos for sacrificing the traditional all purpose complex variable $z = x + iy$ in favor of his ungainly $\lambda = \omega + i\gamma$. Still, although one may recommend this book confidently as regards its accuracy and authority, one wishes it could be rewritten more systematically and more tersely, at half its length and, hopefully, at half its price.

MICHAEL E. FISHER
Baker Laboratory
Cornell University

High Energy Physics, Vols. III and IV

E. H. S. Burhop, *ed.*
380 pp. and 442 pp. Academic, New York, 1969. $19.50 and $22.00

These two volumes (six chapters) complete, according to the editor's preface, "the original plan for a multiauthor work of seventeen chapters covering the most important aspects of the whole field of high-energy physics." But alas, again in the editor's words, "so great has been the development of the subject that a fifth volume is being organized. . . ." To be sure, the quantity of material—preprints, journal papers, conference and summer-school reports and reviews (not all of which might be unequivocally represented as progress)—is vast. One can not but commend any attempt, not simply to collect, but to assess, sift, organize and make readily accessible all this new knowledge.

The subject matter would, perhaps, be better designated as "particle physics" rather than high-energy physics. There are a few chapters dealing with more complex systems (for example, hypernuclei in volume 2, and mesonic atoms in volume 3), but the main emphasis is on the "elementary particle," rather than on high-energy aspects, for example, cosmic processes or the interaction of high-energy radiation with condensed matter. Much of the basic theory and many of the more highly developed parts of the subject are treated in the earlier volumes. Volumes 3 and 4 are chiefly devoted to phenomenology—primarily, but not exclusively from an experimental viewpoint.

Of the six articles in the two volumes, four deal with the strongly interacting particles: "The K-meson Nucleon Interaction" by B. H. Bransden in volume 3; in volume 4, "The Baryon Systems" and "The Meson Systems," both by Donald H. Miller and "Antinucleon-Nucleon Interactions" by R. Armenteros and B. French. The bulk of these articles is devoted to a survey of bubble-chamber results—naturally enough since it is these that provide most of the information about the really unstable particles or resonances. There are lots of histograms, and Dalitz plots—but sadly few pictures of actual events. Bransden's article is more theoretically (in the phenomenological sense) oriented, but duplicates quite a substantial amount of the material covered by the first of Miller's contributions. This is an editorial hazard of this type of polymonograph. These volumes represent some 400-odd pages devoted to the present (1968) state of strong-interaction physics. Ideally, the material might have been better organized and the space more efficiently utilized.

The two remaining articles deal with quite different topics. Eric Burhop's article, "Mesonic Atoms," is high-energy (or particle) physics only in the broadest sense: "high"-energy accelerators are needed to produce the pions, muons and kaons that are necessary to study these phenomena. It is a wide ranging survey of the properties of the various atomic-molecular systems formed when negatively charged particles are stopped in matter. (Electrons are excluded of course—by tradition and by the exclusion principle!) Here and there is some interesting information about elementary-particle interactions and properties, but mainly the physics is nuclear–atomic–molecular, and occasionally solid state. Much of it is quite intriguing, but quite removed from the world of particles and high energies.

"Weak Interaction Physics," by C. Rubbia is, somewhat surprisingly, the shortest chapter. It comprises a summary review of some topics of current interest—CP violation in neutral kaon decay, the conserved vector current hypothesis, CPT and $\Delta I = 1/2$ in nonleptonic decays. Many topics are sketched in only very lightly, if at all.

These two volumes certainly bring together a great deal of useful information and interesting exposition, spanning a wide range of particle or high-energy physics. But the articles are uneven in style and content, ranging from extensive factual compilations valuable for reference (Armenteros and French), to readable, sketchy surveys like expanded conference review papers (Rubbia).

One may ask, although the genre seems well established, what advantages are to be gained by combining in a single cover, with a common index and title, a number of essentially autonomous monographs? At the outset, the aim might be to provide the convenience of an integrated treatment of a whole field, with, among other things, a coherent notation, a single, comprehensive (preferably classified and annotated) bibliography. In practice, at least in a rapidly developing subject, this appears to be unattainable. Economy, especially by avoiding duplication of subject matter and repetition of introductory material, would also be a worthy goal, especially in these days of high-priced publications. But this too appears elusive.

For those engaged in research in particle physics, these two volumes, together with the earlier ones, provide both some interesting and authoritative review articles and useful reference sources (although for how long is another matter!). Not surprisingly in a work of this sort, there are misprints and slips, most of which are readily detected by the reader, but if the reader is one of those "other physicists who are not specialists in the field," he may have difficulty.

SAMUEL DEVONS
Columbia University

An Introduction to Nonlinear Optics

***By* G. C. Baldwin**
155 pp. Plenum, New York, 1969. $9.50

To judge by the number of papers it produces, nonlinear optics is a highly significant new field of physics and technology to which an ever increasing number of scientists are committing their careers. In essence it may be defined as the study of those phenomena, not familiar in ordinary optics, that can be observed when a laser beam traverses a material medium. It is, therefore, an offshoot of laser technology, but is concerned with applications of the laser rather than with laser physics itself. Laser physics and nonlinear optics are both included in the broader term "quantum electronics." Many of the phenomena in nonlinear optics are intriguing and appear to have important device applications.

In the introduction George Baldwin specifies the scope of his book: "This book is intended as an introduction to the subject rather than as a treatise or textbook. Its purpose is to review nonlinear optics by description and explanations which strive for simplicity, brevity, and clarity rather than for completeness and rigor. It is directed toward the engineer or scientist whose speciality leaves little time for study in depth, but who . . . . needs a relatively elementary but nonetheless thorough account before he attacks the rather formidable literature."

I found the author's style to be, with rare exceptions, admirably readable and adequately precise and accurate in presenting physical concepts. On the other hand, it is hardly a criticism to point out that the book should not be referenced as a source in a research paper and no formula in it should be used in research without verifying it first. In fact, the author's aim, as he states in the forward, was to fill the gap between research papers and popular accounts. Although not a specialist in nonlinear optics, Baldwin is an experienced experimental physicist and teacher (he was with General Electric Company, during 1944–67, and has been professor of nuclear engineering,