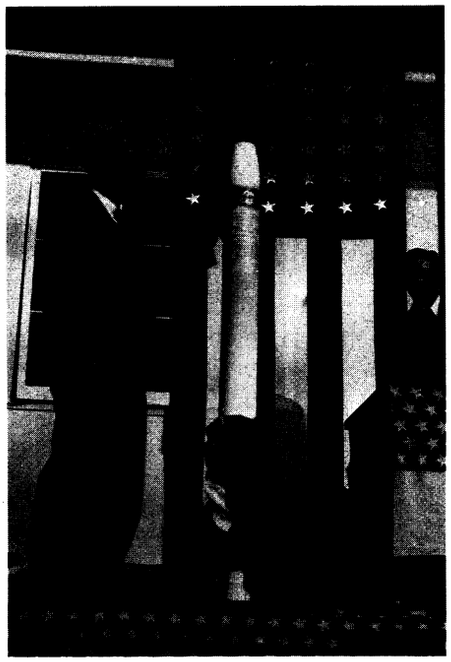

"Ernest C. Watson, administrative head of Caltech's World War II rocket project, with the Institute's one-millionth rocket." [From *Millikan's School*; California Institute of Technology archives]

book that will appeal mostly to Caltech alumni (or perhaps faculty). Even then, *Millikan's School* is concerned with the intersection of the careers of many remarkable men and not with the men themselves. Though it may be true that the whole is greater than the sum of its parts, in this case, certainly, the parts would have been more interesting.

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Condensed Matter Theories

Field Theories of Condensed Matter Systems. EDUARDO FRADKIN. Addison-Wesley, Reading, MA, 1991. xvi, 350 pp., illus. $48.50. Frontiers in Physics.

Field Theories of Condensed Matter Systems—the title alone is enough to awaken suspicion in the community of theoretical physicists of which I am a member. "Field theory," as the phrase is usually used these days, means the techniques of relativistic particle physics theory. This is a realm of science whose inhabitants prefer to breathe only the rarefied air of high mathematical abstraction. In the past they rarely left their world of functional integrals, topological monopoles, and broken chiralities. But a peculiar and rather massive scientific migration has taken place in the last four or five years, during which there has been something of a lull in the appearance of interesting new particle physics data. This, abetted by the discovery of high-temperature superconductivity, has stimulated a number of field theorists to abandon, at least temporarily, their particles and to begin research into condensed matter. The suspicious ones like myself, as the reader may imagine, are the old-fashioned condensed matter physicists, now beset by intruders, who like their theories to have simple mathematics and to be well grounded in experiments. Those woodcuts, so often reproduced these days, of the wary natives greeting Columbus as he steps down on the shore of the New World in his rather ridiculous Renaissance finery just about sum it up.

When I say, therefore, that this is a very good book, it is no empty compliment—it comes from a noble savage. Fradkin has taken the most abstruse parts of the subject and given them the treatment that they have always needed and never received. Take just two examples, the Bethe Ansatz method and topological excitations. It is possible to find clear expositions of both of these topics in the existing literature—possible, but only if you are willing to search long and hard in the library and then sit down for a full week's study of each. By that time you would know far more than was desired. Furthermore, you wouldn't know the proper place of the subject from the point of view of condensed matter physics as a whole. What never existed before but now does is a clear exposition of these topics that is sufficiently detailed to enable a researcher to reproduce the important derivations but not so specialized that a whole new language needs to be mastered. The last point is the most important. Because overspecialization is avoided, these subjects are finally put in context, where their significance can be judged for really the first time.

And are they significant? The complaint about the field theorists has often been that they have produced little that is really new in condensed matter theory but instead have reformulated old theories in new and not necessarily clearer words and mathematics. This book answers that criticism, though in an indirect way. It is true that anyone looking in it for fits of theory and experiment will be disappointed, and nearly all the results have been obtained before by more pedestrian, long-winded, but perhaps simpler methods. The point lies elsewhere,

Vignettes: E. U. Condon and the Bureau of Standards

Edward Uhler Condon was director of the National Bureau of Standards from 1945 until 1951, when repeated subjection to congressional loyalty hearings led him to leave government. In a volume of his Selected Popular Writings *published this year by Springer-Verlag under the editorship of A. O. Barut and others appear the following recollections of his tenure there.*

I was sworn in one afternoon at 4 p.m....and from that moment *was* the director. The next morning I took a cab...and told the driver to take me to the National Bureau of Standards. As we rode out Connecticut Avenue, he remarked: "Bureau of Standards, eh! They should develop some moral standards and some ethical standards." I agreed that they should, but his remark had only heightened the feelings of inadequacy with which I approached my new job.

Some of my most treasured memories of Government service are connected with...appropriations hearings....

On [one] occasion a Congressman was questioning the chief of the Bureau's radio division, who had been talking about the scarcity of space in the radio frequency spectrum for the many needs of communication services. He said: "Doctor, I understand that among you scientists there are two theories: some say space is finite, others say it is infinite. I want to know, where do you stand?" The witness started to explain the limitations of using very low and very high frequencies but the Congressman interrupted him to say, "No, I mean space, you know *space*," making a large and globular gesture toward the part of the three-dimensional continuum in front of him.

The witness squirmed and looked to me for guidance, quite willing to make it finite or infinite for the sake of the budget, but I could only indicate with a gesture that I did not know which was the preference of that particular Congressman. So he gulped hard and said, "I think it's infinite." "Thank you very much Doctor, that's all I wanted to know," replied the Congressman and passed on to another topic.

however. It is that a reformulation, particularly if more compact, does mean better understanding. Hamilton's mechanics were really those of Newton in disguise, but the equations were simpler and more symmetrical. One could say they contained no new physical concepts and be technically correct, but the later invention of quantum mechanics would have been almost impossible without Hamilton's work.

The great virtue of *Field Theories of Condensed Matter* is to have put all these things into one book and to have written it in a way that should be understandable to anyone willing to take the trouble. Just as important, the material is very much up-to-date. Work up to 1990 is included, even the latest on anyon theories of high-T_c superconductivity and Chern-Simons theories of the fractional quantum Hall effect. Unfortunately, the very timeliness of the book has the paradoxical effect of including some work that already now appears a bit dated. The chapter on spin-liquid states, though interesting enough, recounts a subject that flared up briefly and now seems to have disappeared. But the great mass of material included ensures that many things useful to the active researcher are there.

It is at this point in writing a review that one looks back and realizes that the reader probably will not be convinced that the reviewer has studied every page of the book in question. The temptation is great to prove diligence by citing a few misprints or errors, especially if the book is a thick and dense one. So let me point out that there is an error of a factor of 3/2 in the famous Stoner criterion on p. 28. The proofreading is in fact poor, and the book has a very large number of misspellings and misprints. These little matters could easily be taken care of in a second edition, but the author states in the introduction that a second edition will appear only if he "ever gets crazy enough to come back to this nightmare." I would like to wish the genial Professor Fradkin long life, sound mind, and maybe just one more nightmare or two.

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Some Other Books of Interest

Hans Albert Einstein. Reminiscences of His Life and Our Life Together. ELIZABETH ROBOZ EINSTEIN. Iowa Institute of Hydraulic Research, University of Iowa, Iowa City, 1991. xvi, 112 pp., illus. Paper, $12.50.

Hans Albert Einstein (1904–1973), the first of Albert Einstein's two sons, was educated in Zurich, became a hydraulic engineer, joined the faculty of the University of California at Berkeley in 1947, and married his second wife, neurochemist Elizabeth Roboz, in 1959. Before her death in 1958, Hans Albert's first wife had written a biography of her husband that drew upon the extensive correspondence between Albert Einstein and his first wife, Mileva Marić, Hans Albert's mother. Litigation by the Einstein Estate forced suppression of the manuscript and withholding of the correspondence until it eventually appears in Einstein's *Collected Papers*. Without the letters or other documentation, Elizabeth Roboz Einstein's warm reminiscences hardly differ from an afternoon chat with a lately arrived in-law of a famous family. The chat ranges over the entire family, including herself. But the emphasis is as much on Mileva as it is on Hans Albert, who is remembered for his pleasant nature and his independence from his father. The author portrays Mileva, whom she never met, as a long-suffering figure whom Albert rejected as a wife and refused to acknowledge for her contributions to his work. The latter assertion is repeated in an appendix on Mileva by Yugoslavian researcher Dord Krstic, but, as in the text, without any new supporting evidence. Two of Hans Albert's former students provide additional appendixes on his contributions to hydraulics.—DAVID C. CASSIDY, *Hofstra University*

Resonances. A Volume in Honor of the 70th Birthday of Nicolaas Bloembergen. M. D. LEVENSON, E. MAZUR, P. S. PERSHAN, and Y. R. SHEN, Eds. World Scientific, Teaneck, NJ, 1990. xii, 499 pp., illus. $78; paper, $38. From a symposium, Cambridge, MA, May 1990.

The honoree of the present volume shared a 1981 Nobel Prize for his work in laying the foundations of nonlinear optics. During his career at Harvard Bloembergen also directed the work of (in the words of John A. Armstrong) "quite a cast of characters," his students being a "highly international group" that included both theorists and experimentalists and both future university faculty and future corporate executives. Many of these and others of his associates attended the gathering in Cambridge that gave rise to this book. The book opens with a set of brief reminiscences in which Armstrong, Richard W. Damon, G. Durand, and Guo-zhen Yang variously comment on Bloembergen's role as "mentor in the Golden Age of university research," describe thesis work done under his direction, and recount some of Bloembergen's interactions with Chinese physicists. There follow some 30 longer papers by the celebrants, technical in nature but also including some recollections of Bloembergen or comments on his work, grouped under the headings Spins, Stimulated Processes, Nonlinear Optics and Spectroscopy, Surface and Waveguide Nonlinear Optics, Ultrafast Interactions, Materials Science, and Structure and Dynamics. At the end of the volume are included reprints of four "key papers" authored or coauthored by Bloembergen: a discussion of the subject of his own thesis work, nuclear magnetic resonance absorption (1948), a "proposal for a new type solid state maser" (1956), a theoretical treatment of light waves in a nonlinear dielectric (1962), and his Nobel Prize lecture (1982). A bibliography of all Bloembergen's publications and a list of his former students and associates complete the tribute.—KATHERINE LIVINGSTON

Books Received

Advanced Database Techniques. Daniel Martin. MIT Press, Cambridge, MA, 1991. xxiv, 377 pp., illus. $37.50. Series in Information Systems.

Advanced Research Methodology. An Annotated Guide to Sources. R. Barker Bausell. Scarecrow, Metuchen, NJ, 1991. viii, 903 pp. $84.50.

AIDS in America. Charles H. Russell. Springer-Verlag, New York, 1991. xii, 147 pp. $49. Tables of epidemiological and sociological data.

The Allometry of Growth and Reproduction. Michael J. Reiss. Cambridge University Press, New York, 1991. xvi, 182 pp., illus. Paper, $19.95. Reprint, 1989 ed.

Base Bleed. First International Symposium on Special Topics in Chemical Propulsion. (Athens, Nov. 1988.) Kenneth K. Kuo and James N. Fleming, Eds. Hemisphere (Taylor and Francis), Philadelphia, PA, 1991. x, 314 pp., illus. $95.

Biodegradable. Detergents and the Environment. William McGucken. Texas A&M University Press, College Station, 1991. x, 149 pp. $38.50. Environmental History Series, no. 12.

Biomedical Politics. Kathi E. Hanna, Ed. National Academy Press, Washington, DC, 1991. viii, 352 pp. $29.95.

The Cambridge Encyclopedia of Language. David Crystal. Cambridge University Press, New York, 1991. viii, 472 pp., illus. Paper, $24.95. Reprint, 1987 ed.

Carbon Isotope Techniques. David C. Coleman and Brian Fry, Eds. Academic Press, San Diego, CA, 1991. xii, 274 pp., illus. Spiral bound. $79.95; paper, $39.95. Isotopic Techniques in Plant, Soil, and Aquatic Biology.

Catalog of Chromosome Aberrations in Cancer. Felix Mitelman. 4th ed. Wiley-Liss, New York, 1991. 2 vols. boxed. xxxiv, 1987 pp. $250.

Cell Activation. Genetic Approaches. James J. Mond, John C. Cambier, and Arthur Weiss, Eds. Raven, New York, 1991. xvi, 334 pp., illus. $105. Advances in Regulation of Cell Growth Series, vol. 2.

Darwin in Italy. Science Across Cultural Frontiers. Giuliano Pancaldi. Indiana University Press, Bloomington, 1991. xvi, 222 pp. $35. Translated with revisions from the Italian by Ruey Brodine Morelli.

Data Collection Forms in Clinical Trials. Bert Spilker and John Schoenfelder. Raven, New York, 1991. xvi, 672 pp., illus. $90.

De Magnete. William Gilbert. Dover, New York, 1991. lvi, 368 pp., illus. Paper, $11.95. Translated from the Latin edition London, 1600 by P. Fleury Mottelay. Reprint, 1893 ed.

Deep-Sea Biology. A Natural History of Organisms at the Deep-Sea Floor. John D. Gage and Paul A. Tyler. Cambridge University Press, New York, 1991. xvi, 504 pp., illus. $135.