

Attention on individuals

THE QUESTIONERS: Physicists and the Quantum Theory. By Barabara Lovett Cline. 274 pp. Thomas Y. Crowell, New York, 1965. \$5.00.

by Eugen Merzbacher

The history of physics from 1900 until the thirties is a subject of such obvious interest that it is surprising that so little has been written about it. Mrs. Cline has now demonstrated that the task is not impossible. In *The Questioners* she has not intended to produce a comprehensive history of quantum physics and relativity; rather, with remarkable skill, she has written a compact and coherent story of the development of physics in this century, starting with radioactivity, black-body radiation, and special relativity, and ending with quantum mechanics and general relativity.

Apparently, Mrs. Cline is not a physicist, and a few mistakes, such as the incorrect spelling of Sommerfeld's name, confirm this conclusion. But one suspects that she must have observed the species at close hand for a long time. She writes "as if from within," much as Laura Fermi and Jeremy Bernstein have done with more limited objectives, and she exhibits a clear understanding of what is important and what is not.

Written for the educated layman, this is a fairly sophisticated attempt to describe the new concepts of quantum physics and relativity, with almost no equations, by focusing attention on the individuals who did the work. Yet, historical anecdotes are included only to support the basic story which deals with physics and ideas—explained by Mrs. Cline with humor, intelligence, and fine prose.

The use of the controversy between Einstein and Niels Bohr over the interpretation of quantum mechanics as a dramatic climax is a somewhat unconvincing and artificial literary device. Nevertheless, we know that Niels Bohr attached great importance to this debate, and future generations will find it instructive to know about it, even when the issues are no longer alive. Mrs. Cline places the epistemological problems raised by quantum

mechanics before her reader in the traditional form of a dialogue. Anyone who feels that it might be possible to write an even more lucid exposition of this difficult subject will find that this book has set a high standard against which other efforts will be measured. There are only a few factual errors in the book.

This reviewer has subjected *The Questioners* to an acid test of popular science writing by reading it aloud to his wife. With her enthusiastic approval, the book is recommended as a suitable gift to those whose well-being depends on an appreciation of what makes a physicist tick.

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Dynamic programming

QUASILINEARIZATION AND NONLINEAR BOUNDARY-VALUE PROBLEMS. By Richard E. Bellman and Robert E. Kalaba. 206 pp. American Elsevier, New York, 1965. \$8.50.

by T. Teichmann

The advent of large high-speed digital computers has not only enabled the solution of large linear systems but has also begun to make possible quantitative, if not qualitative solutions to certain nonlinear problems. Because of the added complexity introduced by the nonlinearities, even more care must be taken than in the linear case to ensure rapid convergence. The authors, who have both spent many years at the RAND Corporation working on a variety of problems largely clustering round the notion of "dynamic programming," have now essayed to apply similar methods to nonlinear boundary-value problems.

The main pillars of the method are first the application of Newton's method to functional operators (thus replacing simple iteration by a scheme involving first-order derivatives lin-

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PHOTO BY S. A. GOUDSMIT

ENRICO FERMI AND NIELS BOHR walking on the Appian Way in 1931. From: *The Questioners*.

del'sky counters, "If Professor Barzun used a typewriter in writing the sentences above, he also had only to recognize the right key and point or push. But surely he thought before or during typing: pointing may require thought. He is right, however, in saying that objective tests make it easier for the students to get by without learning to write."

While this book deals in general with science teaching, physics is emphasized. Nedelsky shows that his recommendations differ only in priorities from those of the Carleton College conference on physics teaching, the Commission on College Physics and the University of Connecticut Conference. Nedelsky's book, superbly organized and written, is both a guide and a persuasive invitation to implement some of the good ideas in physics teaching. The publisher has contributed attractive styling and typography to this very useful book.