BOOK REVIEWS

PCT, *Spin and statistics, and all that.* By R. F. Streater and A. S. Wightman. Benjamin, New York, 1964. (Mathematical Physics Monograph Series, Vol. 1) viii+181 pp.

The most important problem of present-day physics is without doubt that of understanding the interactions between "elementary" particles. The first proposed solution to this problem has been Quantum Field Theory.

Field theory has permitted the calculation with extraordinary accuracy of the phenomena involving electromagnetic interactions (Quantum Electrodynamics) and was the main source of the "dispersion relations" which are so fundamental in the study of strong interactions. Field theory has, however, been plagued from its beginnings with extremely serious mathematical inconsistencies and has given (until now at least) only partial insight into the problem of strong interactions. These facts have led part of the physicists to believe that the notion of field is inadequate for the understanding of the interaction of particles. Even before that, however, various other physicists started to investigate systematically the possibility of putting field theory on a firm mathematical basis, creating Axiomatic Field Theory (AFT).

In AFT one postulates the existence of fields (as "operator-valued distributions") satisfying a certain number of requirements (the Wightman axioms) of physical origin. The "main problem of quantum field theory," as it is called by Wightman and Streater, remains to see if there exist nontrivial fields satisfying these axioms. It is indeed known that one can describe noninteracting particles by "free" fields, but it is not known if interacting particles can be represented by fields satisfying the Wightman axioms. As of now, the main results of AFT are therefore not on the solution of the "main problem" but on the possibility of obtaining physically relevant consequences of the axioms in a mathematically rigorous manner. Two books are now available describing these results, that under review and one by R. Jost (Lectures in Applied Mathematics, Vol. IV, Amer. Math. Soc.) which the reviewer has not yet seen.

Wightman and Streater begin their book by a short review of relativistic quantum mechanics, mostly describing Wigner's work on the subject.

The second chapter of the book, which is also the longest, is on "some mathematical tools." First a brief introduction to the theory