analysis, with lots of figures and numerical values and discussion as to how things depend on the optical model parameters; one chapter is given to a review of recent work on the subject. The theory, mostly elementary, is derived as needed, and as a result we have a self-contained account that will be found useful by the student and nonexpert as well as by the initiate. Beyond the most elementary things, there is a good account of velocity-dependent and nonlocal interactions and of echoes, the glory, the rainbow, and other things like that in the semiclassical theory of scattering. Much more could have been said, however, about McVoy's analysis of the role of giant resonances in the nucleon-nucleus scattering. And the nuclei dealt with are simply too often regarded as spherical. True, there is a sketchy account of nuclear deformations, but the authors don't make much either of the static or of the dynamic effects due to these deformations. An opportunity has been missed also to give some detail about the superheavy elements which are currently of such great interest and the present theory of which draws heavily on extrapolations of single-nucleon effects.

There is no use complaining that the single-nucleon viewpoint is a very narrow one. It is indeed narrow, but this book and earlier accounts with a similar basis make clear that it is adequate to handle a large number of significant ideas and quantities. The book itself would appear to give the best available account of the subject. It would have been a better one but for some of the omissions.

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Symmetry Violations

The CP Puzzle. Strange Decays of the Neutral Kaon. P. K. KABIR. Academic Press, New York, 1968. x + 138 pp., illus. $6.

In 1964 an experiment was performed which indicated that the symmetry *CP* was violated. By inference from the universally accepted *CPT* theorem, a violation of symmetry under reversal of time was also indicated. Since so much of the progress in elementary particle physics has centered around questions of symmetry, a tremendous surge of theoretical and experimental activity was generated. Since 1964 fully 20 percent of the activity of every major high energy physics laboratory in the world has been devoted to experimental investigations searching for *CP* violation or time-reversal violation. A violation of *CP* symmetry would be indicated if the laws of physics in a mirror-reflected antiworld were different from ours. A time-reversal violation would be indicated if the microscopic laws of physics changed when the sign of the time was reversed in all the equations.

The new discovery, in which long-lived neutral mesons were found to have decays to two π-mesons, reminded one of the discovery of parity violation in 1957. That discovery led rapidly to a deeper understanding of β-decay and the weak interactions. Sadly, the similar vigorous pursuit of the *CP* violation has not led to any deeper understanding at all, and the phenomenon nags one to the point where one wishes that it had never appeared. Nevertheless, the phenomenon does exist, and we must face up to it. An absolute distinction can be made between matter and antimatter.

Kabir's book deals with the first few years of research following the original discovery. The beginning chapter reviews the fundamentals of the strangeness concept and the bizarre nature of the two-component *K*-meson system. The second chapter gives a detailed discussion of the two-pion decays of the long-lived *K*-meson. The third chapter discusses the possible origins of *CP*-noninvariance. Subsequent chapters discuss regeneration and interference phenomena. A final chapter provides a summary of conclusions that can be drawn from the experiments. More technical discussions such as the basis for the Wigner-Weisskopf description of decaying states are placed in appendices. The book is carefully written and contains the best descriptions of the early experiments to be found outside the original papers.

The existence of a *CP* violation or a time-reversal violation has consequences that reach far beyond the neutral *K*-meson system, and it is unfortunate that the author did not spend more time on these topics. Experimentalists have met the challenge by performing many beautiful experiments searching for *CP* or *T* violations. Up to the present there have been a few hints but no hard evidence of any violations outside of the *K*-meson system. The lack of experimental progress outside the *K*-meson system may justify the author's faith that important understanding of the effect will come from the *K*-meson system itself.

It is usual to criticize a book in a rapidly moving field for being out of date before it is published. The reviewer cannot refrain from remarking on this point, for the entire thrust of the experimental results has changed since the book went to press. That the book is thus dated is no fault of the author but is rather due to the fact that some of the early experiments were either incorrect or incorrectly interpreted. Evidence is accumulating that the *CP* effect either is due to a very weak microscopic interaction which contains the violation or is related in some way to the total environment. It may be a problem for the cosmologists. In either case it is unlikely that fruitful experimentation in this field will continue many more years. We must await some other related discovery or brilliant insight before the significance of the *CP* effect will be fully appreciated.

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The Solid State

Excitons, Magnons and Phonons in Molecular Crystals. Proceedings of a symposium, Beirut, 1968. A. B. ZAHLAN, Ed. Cambridge University Press, New York, 1968. xii + 224 pp., illus. $11.50.

As the editor of these proceedings points out, the purpose of the meeting was to help break down barriers in related fields and provide a learning experience. Indeed, six introductory talks were given the group, but are not included in the book; thus, the participants in the symposium received a background to the detailed lectures that the reader will not.

The symposium spanned a wide range of topics from infrared absorption to spin lattice relaxation, from the simpler aspect of vibrating lattices to exciton propagators and second quantization formalism. The book is divided into three sections: Phonons: Spectra and Density of States; Phonons in Combination with Electronic Transitions; and Excitons: Coupling to Phonon and Radiation Fields.

There are several articles that bear special mention because of their clarity of presentation and their educational