dictions have encouraging experimental support, although further investigation is still necessary, particularly in connection with the parity doublets which seem to be required by the theory. It is worth noting that subsequent research has established these results in a much more general context than the Bethe-Salpeter model used by Domokos.

In an application of analyticity and unitarity, Martin summarizes the large body of work which derives bounds on two-particle scattering amplitudes. These bounds have direct experimental content; but more importantly they place a check on model building, since many approximations to the scattering amplitude violate them. Rigorous results in field-theoretic model building are presented by Hepp. By a development of new mathematical tools which can handle the very singular operations that one is invariably led to in quantum field theory, it has been possible to prove the existence of nontrivial relativistic models. Such investigations provide a convenient theoretical laboratory; however, the relevance of the results to physics is not clear at the present time. Only very unrealistic interactions in one or two space dimensions have been analyzed so far, and after many difficult intermediate steps Hepp concludes that the results concerning the nature of divergences coincide with those of perturbation theory. As is pointed out by Thirring in subsequent discussions, the likely reason for this uninformative coincidence is that none of the models considered need infinite charge renormalization.

The second announced topic of the conference, groups, is somewhat underrepresented in these proceedings. Some studies concerning the origin of strong SU(3) breaking are reported. Cabibbo and Pais attempt to arrive at strong breaking in a "spontaneous" fashion; the only breaking effects that are explicitly present are the weak and electromagnetic forces, which one hopes become dynamically enhanced. On the other hand, Ne'eman proposes an explicit symmetry-breaking interaction. These investigations have not as yet produced satisfying results, and it is unfortunate that the very persuasive scheme for SU(3) $\times$ SU(3) breaking due to Glashow and Weinberg, as well as that of Gell-Mann, Oakes, and Renner, is not discussed.

The conference was held at an unfortunate moment, in that much of the contemporary activity in high-energy theory derives from observations which were made, it seems, only a few weeks after the close of the proceedings. Thus the published report is somewhat dated: it is not recognized in the discussion of current algebra that local commutators are considerably more model-dependent than had been assumed, nor is there any mention of the extremely important concept of duality in hadron physics which attempts to connect high-energy and low-energy phenomena. Indeed, the many articles in the book concerning infinite-component field theory achieve significance only now, in connection with duality.

The organizers of the conference might have avoided this common problem in a rapidly changing field if they had included more discussions which were rooted in physical fact. Michel's elegant review of neutral kaon physics and Gell-Mann's summary of the symposium stand out in their frequent reference to experiment. The absence of many other contributions in this style, the datedness of the theoretical emphasis, and the high price of the book make it difficult for me to recommend its purchase for purposes other than those of record.

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A Mostly Empirical Science

Surface and Colloid Science. EGON MATIJEVIĆ and FREDERICK R. EIRICH, Eds. Interscience (Wiley), New York, 1969. Vol. 1, viii + 264 pp., illus.; vol. 2, viii + 304 pp., illus. $14.95 each.

It is obvious to the most casual observer that academic colloid and surface science has suffered a considerable decline in importance over the past 20 years. With a few exceptions, course offerings on the subject have been discontinued; related topics in general physical chemistry courses have been deemphasized or eliminated altogether; and hiring practices have been such as to cause a considerable decrease in the number of active academic researchers in this field. It is likely that this phenomenon is due primarily to the feeling that colloid and surface science is short on fundamental principles and long on messy problems that yield only empirical rules of doubtful validity. However, changing patterns in research emphasis and funding may well presage a resurgence of activity in this practically important area.

The articles contributed to volumes 1 and 2 of the treatise being assembled by Matijević and Eirich have a dual function: they help dispel the illusion that problems involving surfaces and small particles are not susceptible to rigorous analysis, and they will be of great utility to workers coming into this field as well as to those who are already in it.

The editors intend the treatise to comprise a text rather than an "Advances" series. As one might expect, this is achieved with varying degrees of success. After a truly excellent beginning in the form of an article on the thermodynamics of fluid interfaces by F. C. Goodrich, the remainder of volume 1 comprises an extended discussion of the theory and measurement of surface tension by Padday. Although Padday's treatment of the theory is naive and somewhat outdated, the section on experimental techniques is authoritative and complete and is accompanied by a number of valuable numerical tables relating the size and shape of sessile and pendant drops to surface tension. As Princen points out in volume 2, all existing methods of measuring surface or interfacial tension rely ultimately on the analysis of interfacial shapes. Princen's discussion of the analytic expressions for the shapes of cylindrical and axially symmetric interfaces combines nicely with the tabular results in volume 1 for drops to give comprehensive coverage of interfacial shapes for systems of practical importance. Volume 2 also contains articles on wettability and contact angles by Johnson and Dettre; adsorption of solutions of nonelectrolytes by Schay; and aerosols by Hidy. After a skimpy treatment of the fundamentals, Johnson and Dettre give an excellent summary of present knowledge concerning advancing and receding contact angles for liquid drops on solid surfaces and the interpretation of these data. This article provides a particularly good example of the colloid chemists' ability to deduce interesting and useful conclusions from what might appear to be nonreproducible and poorly defined experiments. Schay's article on the adsorption of solutions comprises a review of the relevant thermodynamics followed by a description of the various types of adsorption isotherms encountered in practice. In its approach to the subject, this article typifies the treatise: strong on thermodynamics and authoritative in its discussion of experiment, but weak on theory and interpretation

at the molecular level. Hidy's treatment of the kinetic theory of aerosols is the exception to this generalization, since it is primarily concerned with aerosol particle dynamics and growth as calculated from statistical mechanical and hydrodynamic considerations. Although an excellent article of its kind, it is the least successful in avoiding the "Advances" format; perhaps this is unavoidable considering the advanced nature of the work covered.

On the whole, these volumes comprise a good beginning for the fulfillment of the editors' aim of providing a comprehensive treatise on surface and colloid science. It is hoped that future volumes will continue to maintain the standards set here for content while improving in the proofreading department, where an above-average number of errors have been allowed to slip through.

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