been posed, that one cannot hope for one universal theory, but that theories constructed from first principles and applying to classes of phenomena might well emerge in the next few years.

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Something Old, Something New Is Theme for Particle Physics

Rapidly growing experimental data and often quite short-lived theoretical ideas have prompted a need to bring together young research workers and more mature leaders to provide guidelines for theoretical and experimental goals for the future. The Second Hawaii Topical Conference in Particle Physics, held at the University of Hawaii in Honolulu from 14 to 25 Aug., answered that need. Cosponsored by the National Science Foundation and the University of Hawaii, the conference was attended by about 60 experimental and theoretical physicists who represented a good cross section of high-energy centers in the US. The majority of participants were senior research associates, assistant professors and younger associate professors.

The core of activities consisted of two theoretical and two experimental lecture series. The two theoretical series were presented by Tsung Dao Lee (Columbia University) on theoretical aspects of weak and electromagnetic interactions and by Richard H. Dalitz (Oxford University) on some theoretical aspects of strong interactions. The experimental lectures matched well the theoretical presentations and were delivered by Gerson Goldhaber (Lawrence Radiation Laboratory) on experimental aspects of strong interactions and by Val L. Fitch (Princeton University) on experimental aspects of weak interactions.

Lee's talks covered two distinct topics. Two thirds of the lectures concentrated on questions related to the algebra of observable current operators, and the remainder of the series included a discussion of problems concerning the discrete C, P, T, symmetry operations. After a review of the definition and obvious importance of various electromagnetic and weak current operators, Lee presented foundations of the successful current algebra approach. He gave special attention to the role of Schwinger terms. Following this discussion, the rather novel proposal of the lecturer and coworkers (as well as of several other research groups) concerning the so-called "field-current identity" or "field algebra" was presented. The essence of this approach is to regard the observed local current density operators themselves as the basic canonical field variables. The fundamental ideas and methodology of this theory were illustrated by applications to concrete cases of the isovector as well as the isoscalar electromagnetic currents of hadrons. The second part of the lectures, devoted to C, P, T symmetries, started with a general and somewhat unorthodox review of symmetry principles and their violations. The problem of realizing distinct C, P, T operators for strong, electromagnetic and weak interactions was discussed, and attention was given to the possible existence of a C_{strong}- and T_{strong}-violating electromagnetic interaction. The talks ended with a suggestion for applying the field-current identity proposal to the abnormal part of the electromagnetic interaction, which would possibly lead to the existence of a new strongly-interacting meson with spin one, negative parity, isospin zero and positive G-parity. In honor of the conference, this hypothesized meson was given the name "Hawaiion."

Dalitz's lecture series was primarily devoted to the truly excruciating task of attempting a systematization, on a semiphenomenological basis, of the puzzling, rich features of strong-interaction phenomena. Major questions to be considered in this field are as follows: first, overall features of hadron spectroscopy (that is, patterns of observed levels, and symmetry properties of their decays); second, the mechanism of various types of reaction processes; third, the specific and intriguing study of the high-energy behavior of hadron reactions. These three fields of study overlap, of course, to quite an extent, and the systematic approach meets great difficulties. The unifying viewpoint and major method of attack used by Dalitz was an extensive reliance on the quark model. In order to go beyond qualitative state-

ments, he employed the nonrelativistic limit of the Blankenbecler–Sugar equation, which, in turn follows from the Bethe–Salpeter equation for an instantaneous potential. Furthermore he assumed a three-dimensional oscillator potential for the spatial part of the force. Further assumptions, such as the specification to some extent of various exchange forces and, for instance, spin-orbit couplings, etc., as well as recourse to a few basic features of Reggeism, were injected into the discussion. It was most rewarding to see how, within such a relatively naïve framework, so many features of strong interactions can be accommodated with relative ease. For example, Dalitz gave a simple explanation of the surprisingly narrow width of high-spin boson resonances.

Goldhaber's series of talks appeared to give further credence to the quark model. At any rate, the organizational principle by which Goldhaber managed to keep order in the presentation of extremely weird and confusing experimental material regarding the existence and basic quantum numbers of hadron states with higher and higher energy was the guiding principle as provided by the quark model. The primary topic of these talks was, in accordance with the lecturer's own principal interests and contributions, quantum numbers of boson resonances. After a survey of the well established boson nonets, hints of evidence for higher boson nonets were critically presented. Special attention was paid to experiments relating to K*-type particles in the L = 1 quark-antiquark sets of states. More generally, evidence concerning various boson L clusters was discussed carefully. One interesting consequence of this analysis is the possibility of establishing Regge trajectories for mesons. Apart from boson spectroscopy, some attention was paid also to the studies referring to baryon resonances. The series concluded with a discussion of new tests for SU(3) and the underlying analysis. Finally, Goldhaber made several suggestions for urgently needed new clarifying experiments.

Fitch's lectures concentrated around three major topics: the delineation of the K^0_2 system and its decays, the search for T violation and other weak-decay experiments. The theoretical (phenomenological) analysis of the K^0_2 decays in terms of suitably chosen parameters was followed by a detailed discussion of the latest experimental data relating to these parameters. It appears that whereas considerable progress has been achieved in this area in the last few months, there is still a long way to go before the overall consistency of the parameters can be taken for granted. Regarding recent experiments aimed at detecting T violation in processes other than K^0_2 decays, the results were disappointing. All data emerging from several ingenious experiments are essentially giving a null result. On the other hand, the last lecture by Fitch, on recent precision determinations of a quite large number of crucial weak-interaction parameters, bore testimony to the undaunted spirit and successful work of experimentalists engaged in the study of the difficult, yet apparently so important field. In addition to the papers listed above, several talks were given by other participants.

The overall picture of the conference is presumably best characterized by noting that, while no major breakthrough took place recently (and it does not appear likely that we are on the theshold of one), the ever-increasing acquisition of experimental data is becoming more organized and more precise. At the same time, theoretical thinking appears to have attained an air of greater solidity by concentrating on a few promising lines. These areas are current algebras, their reëstablishment via new looks at quantum field theory (making older ideas appear in a more palatable form), extensive use of the quark model (at least as a guiding principle) and perhaps a revival of Reggeism. I think an equally important line of research exists: the bold utilization of algebraic structures, such as of noncompact noninvariance groups, infinite component fields, etc. This line of research was however, not covered at the conference.

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The conference was directed by San Fu Tuan. Proceedings will be published in the near future by the University of Hawaii Press.

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