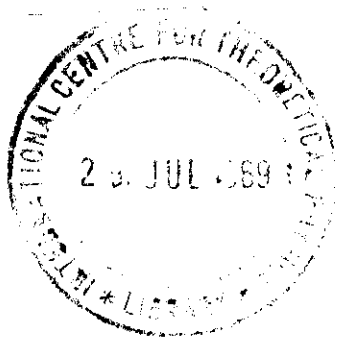

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TOPICAL CONFERENCE

ON

DYNAMICAL GROUPS AND INFINITE MULTIPLETS

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SATURATION OF CURRENT ALGEBRA

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It is almost obvious that finite-component Lagrangian field theories provide saturations of Gell-Mann's current algebras, and it is tempting to believe that this is true of infinite component theories as well. In three papers we have studied this question in detail.

A. A Lagrangian c-number field theory with a finite number of fields provides a model saturation of current algebra under very weak conditions. Under the same conditions, canonical quantization yields a theory of local fields.

B. An infinite component field theory with purely discrete mass spectrum does not give a local current algebra. The reason is that anomalous singularities of the form factors introduce cuts in matrix elements of the resolvant operator. This result suggests that a study of completeness in quantum mechanical problems with energy-dependent potentials may be very interesting.

C. Theories with mixed spectra (partly discrete and partly continuous) do provide model saturations of current algebra (at least those studied), except for special values of the free parameters. Unfortunately, it turns out that the very special cases in which there are no solutions with space-like momenta are the same as the exceptional cases in which the currents are not local. It is possible to evaluate the current commutators and measure the deviation from strict locality. We can arrange that the non-locality be negligible by choosing parameters resembling those of the non-relativistic problem.

The method is as follows. Certain matrix elements of the propagator can be identified with scattering amplitudes. Their analytic

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and asymptotic properties are studied and Fubini sum rules are derived. The crucial point is the identification of each contribution to the sum rule with an intermediary state. When this is possible the sum rule is equivalent to completeness relations, from which local current algebras and local field quantization can be obtained.

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