## V. TRYING TO REPRESENT THE LOCAL $U(3) \otimes U(3)$ ALGEBRA

The advantages of considering the local chiral algebra commutation rules, Eqs. (9), (10), (11), sandwiched between states with $P_z = \infty$ have already been emphasized in the preceding sections.

I want to present now some further investigations which Dashen and I have made at Caltech[15] on the possibility of finding an infinite dimensional representation of the complete set of local commutators.

The motivations which may give physical significance to the problem are the following. We started considering the $U(3) \otimes U(3)$ algebra of vector and axial vector charges, and one may ask whether it is possible to use it as an approximate symmetry for hadrons, i.e., whether hadrons can be described approximately with irreducible or small reducible representations of $U(3) \otimes U(3)$ in the same way as we know it is true for $U(3)$.

The answer we get from experiment is that $U(3) \otimes U(3)$ cannot be a symmetry in any accurate sense. In fact, we know from the Adler-Weisberger relation that the baryon octet and decimet do not form a single irreducible $U(3) \times U(3)$ representation, because they are quite strongly connected through the axial charges to other states, mainly resonances.

Many people[16] however have looked at the question of what happens if we consider them as a part of a reducible representation, that is if we assume baryons to be a mixture of a small number of irreducible $U(3) \times U(3)$ multiplets incorporating besides the N and $N^*$ some other higher resonances which are known to contribute to the Adler-Weisberger sum rule.