SU(3) SYMMETRY IN A BOOTSTRAP MODEL

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Cutkowsky's (1963) idea of the VVV bootstrap has been further explored following the remarks of Gell-Mann, Ne'eman (1964) and Zachariasen (1964). Starting from the interaction Lagrangian

$$L = g_e K^{*0} K^{*-} \rho^+ + g_e K^{*0} K^{*+} \rho + g_0 (K^{*+} K^* - K^{*0} K^{*0}) \rho^0 + h_s (K^{*+} K^* + K^{*0} K^{*}_0) \phi^0 + f \rho^+ \rho \ \phi^0$$

a possible self-consistent solution of the K^* and ρ straps yields the $SU(2)_1$ solutions for the coupling constants and masses of K^* and ρ. The bootstrap conditions also generate another $SU(2)_I$ invariance and mass degeneracy among such $SU(2)_U$ multiplets. These considerations finally lead to full mass degeneracy among the eight physical vector mesons (ρ, K^*, ϕ^0) and the $SU(3)$ solutions for the coupling constants :

$$L = g \left[K^{*0} K^{*-} \rho^+ + K^{*+} \overline{K}^{*0} \rho^- + \frac{1}{\sqrt{2}} (K^{*0} \dot{K}^{*0} - K^{*+} K^{*-}) \rho^0 \right.$$
$$\left. - \frac{1}{\sqrt{6}} (K^{*0} \overline{K}^{*0} + K^{*+} K^{*-}) \phi^0 + \frac{2}{\sqrt{6}} \rho^+ \rho^- \phi^0 \right]$$

The calculation is essentially an extension of the method of Abers, Zachariasen and Zemach (1963). We emphasize that our main result shows that Cutkowsky's and Capps' (1963) assumption of mass degeneracy can be removed.

REFERENCES

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