A DISPERSION THEORETIC APPROACH TO SUM RULES FOR SCATTERING OF PIONS FROM HADRONIC TARGETS

(A dissertation submitted for the degree of Doctor of Philosophy (Science) of the University of Calcutta)

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January, 1970.

Summary

We present a family of sum rules for the scattering of pions from hadronic targets. The isospin combination of amplitudes correspond to unit isospin in t channel. In the case of spin one-half baryonic targets we consider the non-flip, A^- and B^- amplitudes, each of which gives rise to one sum rule for the scattering process considered. The derivation of the sum rules is based on the assumptions of (i) unsubtracted dispersion relations for the amplitudes we consider in the forward and backward directions, and (ii) rho dominance (near direct channel threshold) of t channel singularities in the dispersion relations for backward amplitudes. The sum rules are obtained by equating the forward and backward dispersion relations at threshold. An important characteristic feature of the non-flip sum rules is that the even partial waves are kinematically suppressed for meson-baryon scattering and are absent altogether for meson-meson scattering.

In the πN sector, where a direct verification of our sum rules is possible, they are in satisfactory agreement with the available experimental data. Resonance saturation of our sum rules in the $\pi\Sigma$ sector together with the assumption of universal rho-hadron coupling yields the isovector magnetic moments of Σ in good agreement with the SU(3) prediction. As for pion-baryon couplings our sum rules in both $\pi\Sigma$ and $\pi\Xi$ sectors are consistent with

SU(3) symmetry with F/D ratio $\sim$ 2/3. Our analysis of the $\pi\Xi$ sum rules further suggests the spin-parity assignment $J^P = 5/2^-$ for $\Xi^*(1930)$. The sum rule for πK scattering yields a broken SU(3) relation for the coupling constants $g_{\varphi\pi\eta}$ and $g_{\pi KK^*}$, obtained earlier from current algebra.

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