# S-wave meson scattering in Unitary Chiral Perturbation Theory

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We have studied S-wave meson scattering with isospin(I) 0, simultaneously with S-wave I=1/2, extending some previous works [1] to higher energies up to $\sqrt{s}_{\rm max} \simeq 2$ GeV. To accomplish this, many channels have been included, namely, $\pi\pi$, $K\bar{K}$, $\eta\eta$, $\eta\eta'$, $\eta'\eta'$, $\sigma\sigma$, $\rho\rho$ and $\omega\omega$. The $\sigma\sigma$ and $\rho\rho$ channels mimic $4\pi$ contributions. The interaction kernels are deduced from $U(3)$ Chiral Perturbation Theory Lagrangians. The couplings of $\rho\rho$ to the other channels are obtained via Vector Meson Dominance, gauging the chiral Lagrangians, while those of the $\sigma\sigma$ can be also predicted because within Unitary Chiral Perturbation Theory the $\sigma$ is a dynamically generated resonance. We have then reproduced a great amount of experimental data: besides usual data on $\pi\pi \to \pi\pi$ and $\pi\pi \to \bar{K}K$ S-wave moduli and phase shifts, we have included recent low energy data on phase shifts from kaon decays and event distributions from $\pi\pi \to \eta\eta$ and $\eta\eta'$. Regarding I=1/2 we follow ref.[2] with the same sets of data there included, that is, the phase and modulus of the $K^-\pi^+$ S-wave amplitude up to 2 GeV. Taking together I=0 and 1/2 our fits are further constrained.

Our best fits, allow us to reproduce all the resonances appearing in PDG up to that energy (at least, those which are well established), i.e., besides the $\sigma$ and $f_0(980)$, we obtain the $f_0(1500)$ and $f_0(1710)$. We will discuss also some properties of these resonances. We also keep obtaining the $\kappa$ and $K^*(1450)$ as in ref.[2].

# References

[1] J. A. Oller and E. Oset, Nucl. Phys. **A620**, 438 (1997) [Erratum-ibid. A **652**, 407 (1999)]; Phys. Rev. **D60**, 074023 (1999).

[2] M. Jamin, J. A. Oller and A. Pich, Nucl. Phys. **B587**, 331 (2000).