

S-wave meson scattering up to 2 GeV and its spectroscopy

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The problem of scalar mesons still remains a challenging puzzle for which we do not even know which are the right pieces to set up. We report here on recent advances that have clarified the issue to large extent. The proliferation of resonances (some of them are very broad and/or appear on top of hadronic thresholds) and coupled channels, that interact strongly among each other, makes the study of this sector a hard task. We study the scattering and spectroscopy of the strongly interacting mesons in coupled channels with quantum numbers $J^{PC} = 0^{++}$ and $I = 0$ and $I = 1/2$, up to a center of mass energy $\sqrt{s} \lesssim 2\text{GeV}$. Our framework is based on Unitary Chiral Perturbation Theory, but extended now to include many more channels. Namely, we take for $I = 0$ the following channels: $\pi\pi$, $K\bar{K}$, $\eta\eta$, $\sigma\sigma$, $\eta\eta'$, $\rho\rho$, $\omega\omega$, $\eta'\eta'$, $\omega\phi$, $\phi\phi$, $K^*\bar{K}^*$, $a_1(1260)\pi$ and $\pi^*(1300)\pi$. In addition, and in order to constrain our fits, we also study the $I = 1/2, 3/2$ channels given by $K\pi$, $K\eta$ and $K\eta'$. The resonant content of our fits is discussed, with the appearance of σ , $f_0(980)$, $f_0(1310)$, $f_0(1500)$, $f_0(1710)$ and $f_0(1790)$ for $I = 0$ and the κ and the $K_0^*(1430)$ for $I = 1/2$.

[1] M. Albaladejo and J. A. Oller, arXiv:0801.4929 [hep-ph].

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