

This thesis familiarizes the reader with the process behind the construction of $\pi\pi$ scattering amplitudes. Several representations and transformations necessary to pass from one to another are introduced. Then known solutions of Roy equations are employed to extract values of subthreshold parameters $\alpha_{\pi\pi}$ and $\beta_{\pi\pi}$ from recent experimental data. As a second goal three-flavour chiral perturbation theory (χ PT), which is a low energy effective field theory of quantum chromodynamics, is used to obtain theoretical predictions for $\alpha_{\pi\pi}$ and $\beta_{\pi\pi}$ by applying a technique called resummed approach. A large statistical ensemble of predictions is numerically generated. Subsequently, Bayesian statistics is utilized to get more information about spontaneous symmetry breaking parameters $X(3)$, $Y(3)$, $Z(3)$, which are related to the leading order low energy coupling constants of three-flavour χ PT. These results are then compared to several other recent determinations. Significant shifts in probability distributions compared to Descotes-Genon et al. [2004] are observed. The new results are more consistent with theoretical expectations.

Bibliography

S. Descotes-Genon, N. H. Fuchs, L. Girlanda, and J. Stern. Resumming qcd vacuum fluctuations in three-flavor chiral perturbation theory. *The European Physical Journal C*, 34(2):201–227, May 2004. ISSN 1434-6052. doi: 10.1140/epjc/s2004-01601-4. URL <http://dx.doi.org/10.1140/epjc/s2004-01601-4>.