Abstract

Green functions of currents allow us to study resonances in the low-energy limit of QCD. Using them, we can construct amplitudes or decay widths of processes. By a comparison of the theoretical predictions with experimental measurements we can determine the values of parameters of the theory and obtain a more comprehensive understanding about the behaviour of QCD processes.

In our investigated topic, an odd-parity sector of QCD, exist five nontrivial three-point Green functions, also referred to as correlators. Correlators VVP and VAS have already been studied in [1], whilst a calculation of AAP was provided in [2]. In this thesis we therefore deal with the Green functions VVA and AAA that have not yet been studied before. We present a complete calculation of the contributing Feynman diagrams in the antisymmetric tensor formalism that satisfies high-energy behaviour within the OPE framework, as was shown also in [2]. The obtained results are submitted to phenomenological studies.

Further, we also present an introduction to our calculations of the four-point Green functions $VVPP$ and $VVVV$. The calculations were carried out both in the antisymmetric tensor and vector formalism but due to the complicated tensor structure of the results, the calculations can not be shown here in their complete form.

At the end we also give a description of the 'Mercury' code that we wrote to be able to simplify our calculations as much as possible. We demonstrate the functionality of the code on calculations of many types of vertices with various contributing Lagrangians.

References

[1] K. Kampf and J. Novotny, *Resonance saturation in the odd-intrinsic parity sector of low-energy QCD*. Phys. Rev. D **84** (2011) 014036 [arXiv:1104.3137 [hep-ph]].

[2] T. Kadavý. *On resonances in the anomalous sector of quantum chromodynamics*. Prague: Faculty of mathematics and physics, Bachelor thesis, 2013.