MLL-KOLLOQUIUM

Donnerstag, 09.06.2016, 16^{15} Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1
Treffen zum gemeinsamen Kaffee 16 Uhr

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Renormalons in the Pole Mass and Extracting Quark Masses

Perturbative expansions of some quantities in quantum field theory suffer of a kind of divergence, called the renormalon divergence. The pole mass of a quark in QCD provides an example for the problem with renormalons. The pole mass can be calculated order by order in perturbation theory, but due to confinement it is not possible to have an isolated quark, and hence the pole mass cannot be defined at all orders in perturbation theory. This suggests that the perturbative result for the pole mass cannot converge. There are several resummation techniques to assign values to non-convergent series. For instance, one can use Borel's integral summation with analytical continuation, but this leads to an ambiguous result for the pole mass due to the so-called renormalon singularity.

The presence of renormalons in the pole mass can lead to a large uncertainty in calculating the quark masses. Therefore it is important to study the renormalons in the pole mass, and use new schemes in which the renormalons are canceled order by order in perturbation theory. In this talk, I discuss the renormalon problem and the so-called renormalon-subtracted (RS) scheme. Finally, I present our calculations of quark masses based on the RS scheme.

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