

QCD in the delta-Regime

Monday, 8 November 2010 16:30 (0:30)

Abstract content

The delta-regime of QCD is characterized by light quarks in a small spatial box, but a large extent in the temporal direction. In this setting a specific variant of chiral perturbation theory (the delta expansion) applies, based on a quantum mechanical treatment of the quasi-one-dimensional system. In particular, for vanishing quark masses we obtain a residual pion mass, which has been computed to the third order in the delta expansion. A comparison with a numerical measurement of this residual mass allows for a new determination of low energy constants. We first show that direct simulations in the delta-regime are very difficult. However, an extrapolation of the pion masses measured in a larger volume (p-regime) towards the delta-regime leads to good agreement with the theoretical predictions. From these results, we extract values for the pion decay constant and for a sub-leading low energy constant.

Summary

Primary author(s) : Dr. BIETENHOLZ, Wolfgang (ICN, UNAM); Dr. GOECKELER, Meinulf (University of Regensburg); Dr. HORSLEY, Roger (University of Edinburgh); Dr. NAKAMURA, Yoshifumi (University of Regensburg); Dr. PLEITER, Dirk (DESY Zeuthen); Dr. RAKOW, Paul (University of Liverpool); Dr. SCHIERHOLZ, Gerrit (DESY Hamburg); Dr. ZANOTTI, James (University of Edinburgh); Dr. CUNDY, Nigel (University of Regensburg)

Presenter(s) : Dr. BIETENHOLZ, Wolfgang (ICN, UNAM)

Session Classification : Session I H.NP.P

Track Classification : Hadronic and non-perturbative physics