

MAP-fis Essay Proposal, 2013-2014

Supervisor

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Title

Pomeron in gauge/gravity duality

Area

(Materials, Optics, Condensed Theory, High Energy Theory,...);

High Energy Theory

Summary of Proposal

Pomeron exchange is dominant in QCD processes in the high energy Regge limit, when the exchanged quantum numbers are those of the vacuum. This includes elastic scattering of hadronic states, as well as diffractive processes such as deep inelastic scattering or photon scattering of a proton with production of other states.

Conventional QCD treatments still lack a unifying picture of the above processes. In the case of elastic scattering of hadronic states, cross sections are remarkably well described by the soft-pomeron of Landshoff-Donnachie. In the other cases, for a hard photon probe, the physics is better described by the BFKL hard-pomeron and its improved BK evolution equation.

More recently, pomeron exchange in QCD has been studied using the gauge/gravity duality. In this approach the pomeron Regge trajectory is described as the AdS graviton Regge trajectory. This approach has already been very successful in reproducing HERA experimental data for distinct diffractive processes. In particular, it was possible to reproduce the observed decrease of the pomeron intercept as the energy scale of the probe decreases.

The goal of this essay is to revise pomeron physics in the gauge/gravity duality. If time permits the student should study AdS deformations and compute the glueball spectrum and the pomeron intercept and slope for a reasonable phenomenological model. In particular the computation of the pomeron slope is an important open problem to reproduce the phenomenology of the Landshoff-Donnachie soft-pomeron.

(continue if necessary)



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References

(to allow students first look at topic)

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