Research Networking Programmes

Short Visit Grant ☒ or Exchange Visit Grant ☐

(please tick the relevant box)

Scientific Report

Scientific report (one single document in WORD or PDF file) should be submitted online within one month of the event. It should not exceed eight A4 pages.

Proposal Title: Holographic Pomeron Applications for Explaining Low-x Data

Application Reference N°: 6380

1) Purpose of the visit

As outlined in the short visit proposal, I have an on going collaboration with Nick Evans on using Holographic methods to describe pomeron exchange in HERA scattering data. The purpose of this visit is to have a collaboration meeting to discuss some of the issues that remain of interest. Specifically, the intent was to improve the methodology for breaking conformal invariance in the holographic description of pomeron exchange at low-x, and better understand the physics of confinement and saturation, which might have already been observed in total cross section data coming from the LHC.

2) Description of the work carried out during the visit

During the visit a lot of time was spent discussing the above issues. We were able to clarify the mechanism of pomeron exchange which occurs in many processes in the appropriate energy regime, for example deep inelastic scattering, vector meson production and proton-proton total cross sections. Furthermore we discussed the mechanism by which saturation might occur, and its relationship to confinement. By saturation we mean the fact that pomeron exchange leads to cross sections

that asymptotically grow as a power of center of mass energy, whereas the Froissart bound limits the asymptotic growth to log^2 of the center of mass energy. The one pomeron exchange approximation fits the data really well though, and the point at which it appears to start to break down is conventionally described as the onset of saturation. We have shown in previous work that using the holographic description this onset of saturation is potentially observed much later than was thought, and that the mechanism of confinement can explain some of the observed results that has been thought as the evidence of saturation. During this visit we extensively discussed the evidence for saturation and whether the results we obtained previously are dependent on the hard-wall model of confinement that we have used in our description. Furthermore we discussed other models of confinement (e.g. Maldacena-Nunez) and elucidated how the methods from previous publications might be applied.

3) Description of the main results obtained

The main results obtained are that we understood the method by which we can calculate the pomeron exchange propagator in other confining backgrounds and how we can than use this propagator in order to study the physics of confinement and saturation. Once this is calculated we can potentially further apply it to fit low-x experimental data, in the same manner as we have already done for Vector Meson Production (http://arxiv.org/abs/1307.0009).

4) Future collaboration with host institution (if applicable)

The plan is to continue the ongoing collaboration, and apply the insights we gained during the visit to better understand the physics of confinement and saturation (see points 2 and 3 above).

5) Projected publications / articles resulting or to result from the grant *(ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant)*

We hope to turn the issues we discussed, after further necessary calculations, into at least one publication on the pomeron propagator in a confining background and relationship to saturation. Possibly this can then be applied to further publications on fitting the data for specific processes (e.g. total cross sections, DIS, vector meson...).

6) Other comments (if any)