



Dipartimento di Fisica  
Università di Cagliari  
INFN, Sezione di Cagliari



# HIGH ENERGY PHYSICS COLLOQUIA

6 Giugno 2018 · ore 14:30 · aula C

Pieter Tael

*INFN, Pavia*

## GLUON TRANSVERSE-MOMENTUM DEPENDENT PDFs AT SMALL-X

### Abstract

In recent years, there has been considerable interest in the study of transverse-momentum dependent gluon PDFs (gluon TMDs, for short), which are objects that parametrize the three-dimensional structure of the proton in terms of gluons. These gluon TMDs depend, as their name says, on the gluons transverse momentum, on the hard scale of the process, and on  $x$ , which is the fraction of energy of the proton carried by the gluon. In particle collisions at high energies, such as the ones conducted in the Large Hadron Collider, one can reach very small values of  $x$ , and in this kinematic region the dynamics is characterized by a very high density of gluons (which even opens the possibility of nonlinear effects). For this reason, in this so-called small- $x$  regime, gluon TMDs are of particular importance.

The small- $x$  dynamics of QCD is described very well by an effective theory known as the Color Glass Condensate (CGC), which allows to calculate the dependence of the gluon density on  $x$ , given a certain initial condition. It is therefore the aim of our study to perform the calculation of a certain process in the CGC, extract the gluon TMDs from the result, and finally apply the full CGC machinery to calculate numerically their  $x$  dependence.

In particular, in this seminar we study the forward production of a heavy-quark pair and of a photon+dijet, demonstrate how both the unpolarized and linearly-polarized gluon TMDs appear, and show the numerical results of their evolution in  $x$ .

### Contatti:

Francesco Murgia ([francesco.murgia@ca.infn.it](mailto:francesco.murgia@ca.infn.it))

<http://theory.ca.infn.it/seminars/>

