Contribution ID: **9** Type: **not specified**

A proton imaging via double parton scattering

Wednesday, 18 September 2019 15:35 (25 minutes)

Here we discuss the main outcomes of our investigations on the so called double parton distribution functions (dPDFs). These quantities can be obtained via double parton scattering processes (DPS) in high energy proton-proton and proton nucleus collisions. These new and experimentally unknown distributions represent a novel and promising complementary tool, w.r.t. TMDs and GPDs, to access the 3D partonic structure of the proton. In particular, dPDFs encode new information on two parton correlations in hadrons which cannot be accessed through, e.g., GPDs. In our studies, model calculations have been used to investigate how double correlations affect dPDFs. We considered a fully relativist treatment by using the the Light-Front approach [1]. In this framework, we showed how dynamical correlations, induced by the used model, prevent the factorization of dPDFs in terms of standard PDFs, a common assumption in experimental analyses. Furthermore, since for the moment being dPDFs cannot be directly observed, we also discuss how correlations affect an essential ingredient for the comprehension of the role of DPS in proton-proton collisions used in experimental studies, the so called effective cross section, σ_{eff}. To this aim, dPDFs have been evolved at the experimental momentum scales through the pQCD evolution procedure and then used to calculate σ_{eff}. We claim that the x dependence of σ_{eff}, being x the longitudinal momentum fraction carried by a parton inside the hadron, represents the cleanest evidence of partonic correlations [2]. We have also calculated the DPS cross section for the same sign W pair production process using, as non perturbative input, dPDFs evaluated within a constituent quark model. We showed that partonic correlations could be observed in next LHC run [3]. Furthermore, since indications on the magnitudo of σ_{eff} are available, we also demonstrated how the mean value of σ_{eff} can be related to the mean parotinc distance between two parton active in a DPS process [4].

References
[1] M. Rinaldi et al PRD 87, 114021 (2013); M. Rinaldi et al JHEP 12, 028 (2015); M. Rinaldi et al JHEP 10, 063 (2016) and M. Rinaldi et al PRD 95, 034040 (2017).
[2] M. Rinaldi et al PLB 752,40 (2016) and M. Traini et al PLB 768, 270 (2017)
[3] F. A. Ceccopieri et al PRD 95, 114030 (2017).
[4] M. Rinaldi et al, PRD 97, 071501 (2018).

Authors: RINALDI, Matteo (Dipartimento di Fisica e Geologia. Università degli studi di Perugia. INFN section of Perugia.); CECCOPIERI, Federico Alberto (Universita & INFN, Milano-Bicocca (IT)); Prof. SCOPETTA, Sergio; Prof. TRAINI, Marco (INFN - TIFPA, Dipartimento di Fisica, Università degli Studi di Trento, Via Sommarive 14, I-38123 Povo, Trento, Italy); VENTO TORRES, Vicente (Univ. of Valencia and CSIC (ES))

Presenter: RINALDI, Matteo (Dipartimento di Fisica e Geologia. Università degli studi di Perugia. INFN section of Perugia.)

Session Classification: Parallel 1

Track Classification: Hadronic structure