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A Light-Front analysis of Nucleon 3D structure from double parton scattering

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Summary

Double parton distribution functions (dPDF), accessible in high energy proton-proton and proton nucleus collisions, encode information on how partons inside a proton are correlated among each other and could represent a novle tool to explore the 3D proton structure. In order to evaluate the role of double correlations between two partons in a proton, dPDFs have been calculated by means of quark models [1, 2]. In a recent paper of ours, we have presented a dynamical calculation of the so called "effective cross section", \sigma_eff , fundamental ingredient for the comprehension of the role of double parton scattering in proton-proton collisions. We have found an expression for \sigma_eff , suitable for this kind of analyses, in terms of standard PDFs and dPDFs. All these quantities have been previously calculated in a Light-Front, fully Poincar´e covariant approach, following Ref. [2]. In this talk, the results of the calculation of dPDFs and \sigma_eff will be discussed at the scale of the model and at higher energy scales, evaluating properly the pQCD evolution of the calculated dPDFs, both in the non-singlet and singlet sectors [3]. This procedure is fundamental to compare our results with the available experimental data for \sigma_eff . For the latter quantity, results show a strong x dependence in the valence region, a feature which could allow to obtain novel information on the three dimensional nucleon structure. The possibility to measure two-parton correlations in proton-proton scattering at the LHC, studying specific final states, will be addressed.

References
[1] M. Rinaldi, S. Scopetta and V. Vento, Phys. Rev. D 87, 114021 (2013)
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[3] M. Rinaldi, S. Scopetta, M. Traini and V. Vento, Phys. Lett. B 752, 40 (2016)

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