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Overview of the COMPASS results on the nucleon spin

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The COMPASS experiment at CERN is one of the leading experiments studying the spin structure of the nucleon. These studies are being carried on since 2002, by measuring hadrons produced in deep inelastic scattering (DIS) of polarised muons off different polarised targets (NH₃ for polarised protons and 6LiD for polarised deuterons). One of the main goals is to determine how the total longitudinal spin projection of the nucleon, $1/2$, is distributed among its constituents, quarks and gluons. We review here the recent results on the quark and gluon helicities obtained by COMPASS, using a longitudinally polarised target. However, the understanding of the nucleon spin structure based only on parton helicities is not in any way complete. Therefore, COMPASS also studies the transverse momentum dependent parton distributions (TMDs) with a transversely polarised target. Concerning the TMDs, the latest results on the Collins and Sivers asymmetries will be shown. The former is sensitive to the transverse spin structure of the nucleon, while the latter reflects the correlations between the quarks transverse momentum and the nucleon spin. This overview will conclude with a summary of the approved plans of COMPASS for the near future: the study of TMDs with a pioneering polarised Drell-Yan experiment, and the measurement of generalised parton distributions (GPDs).

Summary

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