

Report on the session “SPS Deep-Inelastic Scattering, including polarized targets” at the New Opportunities on the Physics Landscape at CERN.

Convenor: E.C. Aschenauer

Comments from the Convenor

All abstracts (12, 26, 27, 28, 29 and 92 (presented in a different session)) submitted to this session focused on data taking with the COMPASS experiment to address open questions of the spin structure of the nucleon (26, 27, 28, 29).

Andreas Schaefer gave an overview talk summarizing the recent developments in Lattice-QCD and phenomenology important to unravelling the spin structure of the nucleon. The progress in lattice calculations should be especially mentioned, i.e. the first calculations on the orbital momenta of the u and d quarks.

Nicole d’Hose summarized abstracts 27 and 28. One year of running with a polarised hydrogen target at 200GeV/c beam energy would allow improving the results on the structure fct. g_1^p significantly. The data would also allow measuring semi-inclusive asymmetries. These asymmetries will extend the range in x compared to existing data by one decade to 10^{-3} in x, which will be extremely important to constrain the polarisation of the light sea quarks further. In addition the extraction of the breaking of flavour symmetry in the polarisation of u-bar and d-bar will be possible.

The measurement of exclusive reactions, i.e. deeply virtual Compton scattering, allow constrains of generalized parton distributions (GPDs). GPDs are important because the 2nd moment of a specific combination of GPD H and E allows addressing the question of the contribution of orbital angular momentum to the spin of the proton. It was proposed to constrain GPDs with measurements of the DVCS beam spin and beam charge asymmetry, as well as to measure the transverse target single spin asymmetry for DVCS. Both phases will need upgrades of the spectrometer, like installing a recoil detector to detect the recoiling proton to ensure exclusivity as well as improving the electromagnetic calorimeter to detect the real photon as good as possible. These measurements will allow reaching smaller x than currently available to other fixed target experiments like HERMES or at JLab. The reach in Q^2 , a variable extremely important for the extraction of GPDs via evolution, can only be increased if the luminosity can be increased by a factor of five.

Franco Bradamante summarized abstracts 26 and 29. Both abstract are related to measurements in the very active field of transverse momentum distribution fcts.

Compass proposes to measure with a transversely polarised proton target for one year. This would allow increasing the statistics on the existing transverse proton data sample significantly. Not only will this allow models to better constrain the transverse quark polarisations dq , but also much more importantly it will potentially clarify the disagreement between the HERMES and COMPASS data on the Sivers structure fct. Understanding this disagreement is extremely important for the field of TMDs, because

several new measurements and projects are planned to measure the Sivers structure fct. The Sivers fct. offers in certain models an access to the orbital angular momentum of Quarks independent of the measurements of GPDs. Compass proposes also to measure Drell-Yan on a transversely polarised / unpolarised target using in phase 1 a p- beam, there exists also first ideas of a 2nd phase with antiproton and K- beams.

The goal of the DY-measurements in phase 1 are to study the QCD prediction that the sign of the sign of the Sivers and Boer-Mulders fct. in DY is opposite to the sign in semi-inclusive DIS. There several other experiments at Fermi-lab and RHIC planned to measure these TMDs in DY-measurements.

Friedrich Dydak summarized in his talk an idea to improve the extraction of the unpolarised quark distributions by measuring with unpolarised hydrogen and deuterium targets and the COMPASS spectrometer the ratio of F_2^n/F_2^p to 0.1% accuracy. During the discussion it was suggest that the nuclear corrections to the Deuterium data will make it difficult to reach the advertised precision. It was also suggested to stay in close contact with the LHC working group on parton distributions before a LoI is submitted to SPSC.