

Novel Experimental Probes of QCD in SIDIS and e^+e^- Annihilation

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Semi-inclusive deep inelastic Scattering (SIDIS) has been a very successful tool to investigate the partonic structure of the nucleon over the last decade. Compared to inclusive DIS, information about the quantum numbers of the struck quark can be inferred from the identity, distribution and polarization of the final state hadrons. Up to now, virtually all knowledge about the quark-gluon structure of the nucleon from SIDIS has been gained from distributions of independently observed scalar hadrons. However, given the amount of data current and future experiments at JLab, RHIC, KEK and the EIC will collect, new paradigms have to be explored to leverage the statistical power of the data. Similar to other fields in nuclear and particle physics, it is natural to move towards the exploration of more complex correlations in the observed final state. This talk will discuss recent results and future prospects of using di-hadron correlations and polarized hyperon probes to study QCD in SIDIS, pp and e^+e^- annihilation. Both of these probes exploit additional degrees of freedom in the final state, given by the relative momentum of the di-hadron pair and the hyperon polarization, respectively. This talk will focus on recent results and opportunities opened by these probes to study nucleon structure, hadronization and QCD in novel ways. The focus will be on planned SIDIS measurements at CLAS12 at JLab and e^+e^- at Belle II.

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