

TMDs studies with fixed-target collisions at LHCb

Fixed-target pp and pA collisions with a proton beam at the TeV scale provide unique laboratories for the study of the nucleon's internal dynamics and, more in general, for the investigation of the complex phenomena arising in the non-perturbative regime of QCD. Due to the substantial boost of the reaction products in the laboratory frame, fixed-target collisions allow to access the poorly explored backward center-of-mass rapidity region, corresponding to the high x -Bjorken and high negative x -Feynman regimes. Thanks to its forward acceptance and its outstanding performances, the LHCb detector at the LHC is perfectly suited for the reconstruction of particles produced in fixed-target collisions at $\sqrt{s_{NN}} = 110$ GeV. The LHCspin project aims to bring both polarized and unpolarized physics at the LHC through the installation of a gaseous fixed target at the upstream end of the LHCb detector. In particular, the use of transversely polarized H and D targets will allow to study the quarks TMDs in single-polarized Drell-Yan at unique kinematic conditions (high- x at moderately-high Q^2). Furthermore, thanks to the LHCb high reconstruction capabilities for particles containing heavy quarks, access to the essentially unknown polarized and unpolarized gluons TMDs will be possible through the study of inclusive quarkonia or heavy-mesons production. An overview of the possible TMDs studies to be performed with polarized and unpolarized fixed-target collisions at LHCb is presented.

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