



Contribution ID: 11

Type: **not specified**

LHCspin: a polarized fixed-target experiment at the LHC

Wednesday, 11 June 2025 15:05 (35 minutes)

A polarized gaseous target, operated in combination with the high-energy and high-intensity LHC beams, has the potential to open new physics frontiers and to deepen our understanding of the strong interaction in the non-perturbative regime of QCD. Specifically, the LHCspin project aims to perform spin-physics studies in high-energy polarized fixed-target collisions using the LHCb detector. Being designed and optimized for the detection of heavy hadrons, LHCb will allow to probe the nucleon structure through, e.g., the inclusive production of c- and b-hadrons, and ideal tool to access the essentially unexplored spin-dependent gluon TMDs. This configuration will allow to explore the nucleon internal dynamics at unique kinematic conditions, including the poorly explored high x-Bjorken and high x-Feynman regimes. With the installation of the proposed setup, LHCb will become the first experiment delivering simultaneously unpolarized beam-beam collisions at 14 TeV and both polarized and unpolarized beam-target collisions at center-of-mass energies of the order of 100 GeV. The status of the LHCspin project is presented along with a selection of physics opportunities.

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Session Classification: TMD experiments at CERN