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LHCspin: a polarized fixed-target experiment at the LHC

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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 at the scale of confinement. 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., inclusive production of c- and b-hadrons, an ideal tool to access the essentially unknown 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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