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The LHCspin project

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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 ($2 < \eta < 5$) 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 to the LHC through the installation of a gaseous fixed target at the upstream end of the LHCb detector.

This ambitious task poses its basis on the recent installation of SMOG2, the unpolarized gas target in front of the LHCb spectrometer. Specifically, the unpolarized target, already itself a unique project, will allow to carefully study of the dynamics of the beam-target system, and clarify the potentiality of the entire system, as the basis for an innovative physics program at the LHC.

Category

Polarized Targets

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