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The LHCspin project

The goal of LHCspin is to develop, in the next few years, innovative solutions and cutting-edge technologies to access spin physics in high-energy polarized fixed-target collisions, by exploring a unique kinematic regime given by the LHC beam and by exploiting new probes.
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 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.
The forward geometry of the LHCb spectrometer ($2< \eta <5$) is perfectly suited for the reconstruction of particles produced in fixed-target collisions. This configuration, with center-of-mass energies ranging from $\sqrt{s}$=115 GeV in pp interactions to $\sqrt{s_{NN}}$=72 GeV in collisions with nuclear beams, allows to cover a wide backward rapidity region, including the poorly explored high x-Bjorken and high x-Feynman regimes. With the instrumentation of the proposed target system, LHCb will become the first experiment delivering simultaneously unpolarized beam-beam collisions at $\sqrt{s}$=14 TeV and polarized and unpolarized beam-target collisions. The status of the project is presented along with a selection of physics opportunities.

Author: DI NEZZA, Pasquale (INFN e Laboratori Nazionali di Frascati (IT))

Presenter: DI NEZZA, Pasquale (INFN e Laboratori Nazionali di Frascati (IT))