



Contribution ID: 13

Type: **not specified**

AFTER@LHC: The Spin Physics Program

Thursday 29 September 2016 09:00 (35 minutes)

A fixed-target experiment using the LHC beams (AFTER@LHC) with a polarized target offers a unique opportunity to study the transverse spin structure of a polarized nucleon in a wide kinematical range. Recent studies have shown that a number of single transverse-spin asymmetries (STSA) are large enough to be precisely measured in the kinematical region accessible with AFTER@LHC, in particular for the Drell-Yan process as well as for single-pion, isolated photon, and jet productions. Such measurements would provide a precise handle on the quark Sivers effect. Moreover, AFTER@LHC is the ideal experimental set-up to measure also STSA sensitive to the gluon Sivers effect, of which very little is known, in processes like quarkonium (J/ψ , $\psi(2S)$, $Upsilon(1S,2S,3S)$ even χ_c) and open charm production.

In this presentation, we will first review the recent ideas about the implementation of the AFTER@LHC with a polarized target: internal - inspired by the LHCb SMOG and HERMES gas-target systems - or used with a beam extracted by a bent crystal - inspired by the LUA9 technology. We will then discuss sensitivity studies for STSA measurements of Drell-Yan, quarkonium, and open charm production.

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Session Classification: Plenary

Track Classification: I. Future