Sivers Effect Asymmetries In Hadron-Hadron Collisions

C.J. Bomhof

Department of Physics and Astronomy, Vrije Universiteit Amsterdam, NL-1081 HV Amsterdam, the Netherlands

It has been observed that the Sivers effect in SIDIS appears with a relative minus sign as compared to the Drell-Yan process. This sign difference is a direct consequence of the future (SIDIS) and past (Drell-Yan) pointing Wilson lines in the Sivers distribution function. Their presence is required to obtain a color gauge-invariant field theoretical definition of the Sivers distribution function. The Wilson lines are path-ordered exponentials, where the integration path is process dependent in the case of transverse momentum dependent functions. In particular, the path is fixed by the color flow through the partonic scattering process. We will generalize these observations to single-spin asymmetries in inclusive back-to-back pion production in proton-proton scattering $(p^{\uparrow}p \rightarrow \pi\pi X)$, assuming that they can be written as convolutions of parton distribution and fragmentation functions and perturbatively calculable partonic parts. As a consequence of the presence of the Wilson lines these partonic parts are, in general, not equal to the standard partonic scattering cross sections. They will possibly also play a role in inclusive single pion production, although in that case subleading twist contributions should also be taken into account.