Fragmentation into spin-1 hadrons

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Fragmentation into polarized hadrons is attracting attention not only because it is interesting process in itself, but also because it can be used as a "probe" to measure the transversity distribution in semi-inclusive deep inelastic scattering.

At present, the best candidates to act as chiral partners of the transversity distributions are considered to be the Collins function [1], polarized spin-1/2 fragmentation functions [2] and two-hadron interference fragmentation functions [3].

Another equally good possibility is to observe polarized spin-1 fragmentation functions. This option has been usually disregarded because it can be considered to be a specific realization of the more general case of two-hadron production and because one has to deal with the somewhat unfamiliar concept of tensor polarization. In reality, spin-1 fragmentation functions share the same status of spin-1/2 functions, both conceptually and practically.

In this talk I will show how the analysis of spin-1 fragmentation [4] allows for the identification of several asymmetries where the transversity distribution appears in connection with leading-twist T-odd fragmentation functions. I will show what are the necessary observables that need to be measured.

Most of spin-1 fragmentation functions are unknown, although some data are available from e^+e^- annihilation. However, thanks to the probabilistic nature of leading-twist functions, they have to respect some bounds which can be important as a guidance to evaluate their magnitude [5].

Finally, I will suggest a simple way [6] to model the T-odd fragmentation functions involved in transversity measurements.

[1] See talks by D. Boer and R. Kundu.
[2] See talk by U. D'Alesio.
[3] See talk by M. Radici.
[4] A. Bacchetta, P.J. Mulders, Phys. Rev. D 62 (2000) 114004.
[5] A. Bacchetta, P.J. Mulders, hep-ph/0104176.
[6] A. Bacchetta, R. Kundu, A. Metz, P.J. Mulders, Phys. Lett. B 506 (2001) 155.

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