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Transversity distributions from difference asymmetries in semi-inclusive DIS.

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In recent years information on the transversity distribution h_1 has been obtained combining the Collins asymmetry results from semi-inclusive deep inelastic scattering (SIDIS) data on transversely polarized nucleon targets and the information on the fragmentation function of a transversely polarized quark from the asymmetries measured in e^+e^- annihilation into hadrons. An alternative method was proposed long time ago, which does not require the e^+e^- data, but allows one to get ratios of the u and d quark transversity distributions from the SIDIS data alone. The method utilizes the ratio of the difference of the Collins asymmetries of positively and negatively charged hadrons produced on transversely polarized proton and deuteron targets. We have applied this method to the COMPASS proton and deuteron data, and extracted the ratio h_1^d/h_1^u . Our results are very close to those obtained in a previous point-by-point extraction based both on SIDIS and e^+e^- data. Thus the new method strengthens the validity of the determination and of the procedures presented in earlier works on the subject.

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