Chiral Odd Fragmentation Functions at Belle

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In unpolarized electron positron annihilation, there are interesting and possibly non-zero azimuthal asymmetries [1], which measure novel chiral odd fragmentation functions, such as the Collins function C [2] or two pion interference fragmentation function q_I [3] [4]. Recent results from the HERMES [5] and SMC [6] collaborations on azimuthal asymmetries in inclusive hadron production in DIS indicate that C is different from zero and potentially rather large. It also has been discussed [9] that the single spin asymmetries measured by FermiLab E704 [7] and AGS E925 [8] can be understood in terms of the Collins effect. The success of nucleon Transversity measurement at pp and ep collisions critically depends on the availability of these fragmentation functions.

e^+e^- collider are in an excellent position to extract the Collins and interference fragmentation functions. The measurement requires two-jet events originating from light quarks and the azimuthal correlations of hadrons around the jet-axis on both sides. We believe that B factories are the place to measure these fragmentation functions, because of their high luminosity and excellent detector with PID capabilities. There is an ongoing effort to extract two pion interference fragmentation functions from Delphi data at LEP. However, B factories will have the advantage of larger asymmetries, since the collins function scales with $2lnQ^2$, also it's free of the additional complications from the Z pole.

A small group of people from RHIC spin, including Matthias G. Peedekamp and myself, was accepted to the Belle collaboration to carry out the extraction of these fragmentation function from their off resonance data. Already existing 9 million events, which corresponds to 3/fb, in off resonance Belle dataset alone will make a significant measurements of CC, q_Iq_I and Cq_I.

References

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