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Dihadron correlations in polarized quark hadronization.

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We present our recent calculations of the complete set of the leading-twist quark-polarization-dependent dihadron fragmentation functions (DiFFs) to pion pairs. The quark-jet framework is used to model the sequential hadronization of a polarized quark into hadrons, where the polarization transfer to the remnant quark in each hadron emission step is calculated using the spin density matrix formalism. Using Monte Carlo (MC) simulations of the hadronization process, we find non vanishing signal for both helicity- and transverse-polarization-dependent DiFFs. A method is developed for extracting the angular moments of these DiFFs, which enter the expressions for the azimuthal asymmetries for an electron-positron annihilation process into two pairs of hadrons from back-to-back jets and the dihadron production in semi-inclusive deep inelastic scattering. Finally, we derive explicit integral expressions for all four DiFFs where only two hadrons are emitted by a quark and use them to validate our MC results. We also utilize these expressions to study the underlying mechanism for generating the dihadron asymmetries in our sequential hadron emission framework, and discover the crucial role played by the Collins effect.

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