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Two-Particle Correlations in Hadronic e+e- Collisions at Belle and Their Implication

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We present the measurement of two-particle correlations in hadronic e^+e^- collisions data collected by the Belle detector at KEKB. The clean e^+e^- collision system is conducive for the unambiguous investigation of the azimuthal anisotropy of final-state charged particles found in various heavy ion and proton-proton collisions. Following up on the first examination in e^+e^- annihilation events using the small archived ALEPH dataset, high-statistics Belle datasets at center-of-mass energies of $\sqrt{s} = 10.52$ GeV (89.5fb^{-1}) and 10.58 GeV on the $\Upsilon(4S)$ resonance (333.2fb^{-1}) are analyzed. The larger statistics also enables the study of very rare events of the multiplicity distribution tail. Measurements are reported as a function of the charged particle multiplicity over the full relative azimuthal angle ($\Delta\phi$) and three units of pseudorapidity ($\Delta\eta$). Correlation functions calculated in two coordinate systems with respect to different reference axes —the conventional beam axis and the event thrust axis —are measured. The thrust-reference-axis coordinate is the more natural representation for e^+e^- annihilating into a quark-antiquark pair for providing sensitivity to the color activity emitted transverse to the diquark fragmentation. In this talk, we also present a qualitative understanding for the measured correlation structure based on Monte Carlo simulations. We will discuss the correlations for jet fragmentation in this low energy regime and for the special scenario of $b\bar{b}$ bound state decays.

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