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Two-particle correlation in e+e- collisions at 91-209 GeV with archived ALEPH data

The first measurement of two-particle angular correlations of charged particles emitted in high energy e^+e^- annihilation up to $\sqrt{s} = 209$˜GeV is presented, using data collected with the ALEPH detector at LEP between 1992 and 2000. The correlation functions are measured over a broad range of pseudorapidity and full azimuth as a function of charged particle multiplicity for the first time with LEP2 data. The correlation is measured with both the lab coordinate system and the thrust coordinate system, with the latter sensitive to potential medium expanding transverse to the color string between the outgoing quarks in an $e^+e^- \to q\bar{q}$ topology. At 91 GeV, no significant long-range correlation is observed in either the coordinate analyses. It provides new insights to parton showering and hadronization modeling. Results with e^+e^- data at higher collision energy up to 209 GeV will also be presented, with an event multiplicity reach up to around 50 and with different event topologies. A hint of a tantalizing structure emerges in high multiplicity e^+e^- events that is not seen in their low multiplicity counterparts. Studies of the high energy annihilation data will expand our search for collective phenomena in e^-e^+ collisions to a new phase space for a potential discovery. They also serve as an important reference to the observed long-range correlation in proton-proton, proton-nucleus, and nucleus-nucleus collisions.

Submitted on behalf of a Collaboration?

No

Participate in poster competition?

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