ABSTRACT

We review the picture of QCD jets as it emerged from the analyses based on perturbative QCD in the leading log approximation (LLA) and beyond it. Part I (by K. Konishi) gives a brief review of the intuitive (fractal) picture and quantitative description of QCD jets in LLA, and contains discussions on some salient aspects of QCD corrections beyond the leading order. Part II (by J. Kalinowski) is a summary of the construction of the jet calculus beyond the leading order, and of calculations to next-to-leading order of jet calculus vertices and generalized Altarelli-Parisi parton decay functions.

I.1 PICTURE OF QCD JETS IN LLA

At this meeting Söding has presented beautiful data from PETRA, which show that the Quantum Chromodynamics (QCD) has passed a first series of tests in the physics of jets. Among others, three jet-like events were observed with a rate consistent with the expectation from the lowest-order QCD diagrams (with a reasonable value of $\alpha_s$). A closer look into the analyses based on perturbative QCD, however, suggests that the picture of hadronic jets produced in hard processes (typically in $e^+e^- \rightarrow$ hadrons) is

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more complicated than naively suggested from lowest order Feynman diagrams\(^1\).

Consider a typical event in \(e^+e^-\rightarrow\) hadrons shown in Fig. 1. How many jets are there? This question can be answered in two different ways. According to the by-now standard approach à la Sterman-Weinberg, one must give precise criteria as to what should be called a jet in terms of opening angle \(\delta\) of the cone and the energy fraction \(\varepsilon\) outside it, and then each event would be either

\[
\begin{align*}
\gamma^* & \quad + \quad + \quad + \\
& \quad + 
\end{align*}
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