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First measurement of anti-kT jet spectra and jet substructure using the archived ALEPH e+e- data at 91.2 GeV

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We present the first anti-kT jet spectrum and substructure measurements using the archived ALEPH e+e- data taken in 1994 at a center of mass energy of $\sqrt{s} = 91.2$ GeV. Jets are reconstructed with the anti-kT algorithm with a resolution parameter of 0.4. It is the cleanest test of jets and QCD without the complication of hadronic initial states. The fixed center-of-mass energy also allows the first direct test of pQCD calculation. We present both the inclusive jet energy spectrum and the leading dijet energy spectra, together with a number of substructure observables. They are compared to predictions from PYTHIA6, PYTHIA8, Sherpa, HERWIG, VINCIA, and PYQUEN. None of the models fully reproduce the data. The data are also compared to two perturbative QCD calculations at NLO and with NLL'+R resummation. The results can also serve as reference measurements to compare to results from hadronic colliders. Future directions, including testing jet clustering algorithms designed for future electron-ion collider experiments, will also be discussed.

In-person participation

Yes

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