Exercises, part 5

Thursday 2003-11-13 - Thursday 2003-11-20 16:00

1. kT jet algorithm   7 points

Write an algorithm which clusters N input 3-momentum vectors $\vec{p_i}$ (we neglect masses) into n jets $\vec{P_k}$ (4-momenta!) using the kT algorithm (G.C. Blazey et al., Run II Jet Physics, hep-ex/0005012, siehe WWW) as described in the lectures. However, use as distance measure for pairs the following more general formula

$$d_{ij} = min(p_T^i, p_T^j)^2 \, \frac{R_{ij}^2}{D^2} \qquad R_{ij}^2 = (\phi_i - \phi_j)^2 + (\eta_i - \eta_j)^2$$

which depends on the dimensionless 'jet resolution parameter' D.

2. kT jets   3 points

The ASCII file 'hadrons.txt' (WWW!) contains 100 hadronic events generated with Pythia (2000 GeV, with cuts selecting high pT events).

Format:

```
81                      <- number of hadrons in this event
-0.6 1.33 1.52          <- px py pz  of first hadron
-0.65 0.15 2.2          <-              second
0.07 -1.15 3.39         <-              .....
-0.42 -0.41 5.77
1.12 -0.7 -0.74
0.66 -0.75 -6.32
...
```

The file contains only particles with $E > 1\,\mathrm{GeV}$ amd $|\eta| < 4$.

Apply the kT algorithm with $D = 1$ and determine how many events/jets fulfill the selection used in the D0 publication Phys. Lett. B 525, 211 (2002) ($p_T > 60\,\mathrm{GeV}$, $|\eta| < 0.5$).