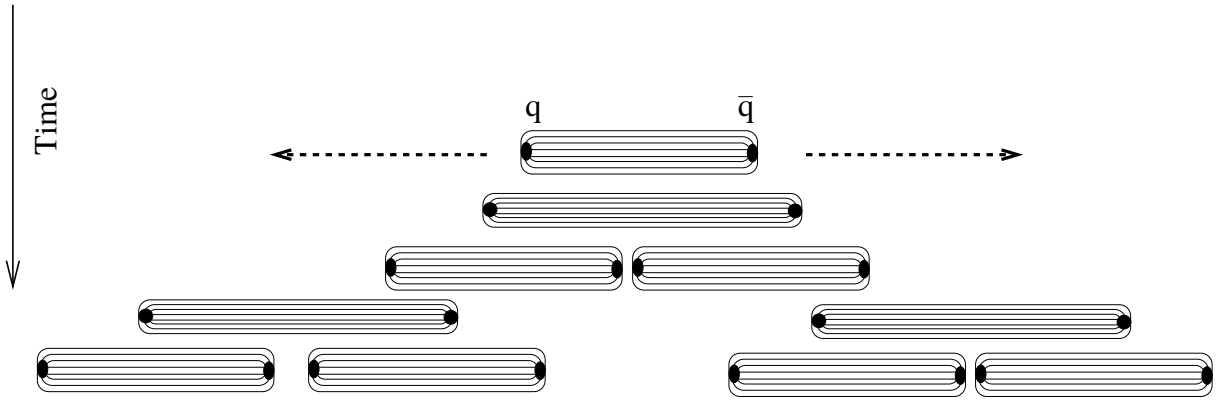

Figure 1.8: *Illustration of the hadronization process according to the Lund string model.*

happens in a scattering experiment, a colour tube is formed as the distance between the quarks exceeds ≈ 1 GeV^{-1}, and it will be stretched out with time. A $q\overline{q}$-pair, which is produced out of vacuum from a quantum fluctuation process, may tunnel through the barrier presented by the constant field inside the tube, with a probability given by

$$exp(-\frac{\pi(m^2 + P_T^2)}{\kappa}),$$

where m is the mass of the quark-pair and P_T is the transverse momentum of the quark and the anti-quark relative to the string. The new $q\overline{q}$-pair will be pulled apart by the field of the original quarks and the field that is built up between them will at some point cancel the original field in that region, and cause the tube to split up in two parts of lower energy. If the initial energy in the string is very high a number of new string fragments will be created. Since the energy of the string is higher at the ends than in the center, due to the kinetic energy carried by the initial quark and antiquark, the string will primarily break at the ends and the produced particles will essentially move in the same directions as the original quark and antiquark, respectively. This gives rise to collimated flows of particles, called *jets*. Figure 1.8 illustrates how mesons are produced through consecutive string breaking.

In case a diquark and an antidiquark is produced as the string breaks, the original quark will connect to the diquark via one colour string and the original antiquark will be colour connected to an antidiquark, i.e. a baryon and an antibaryon have been created. The probability of creating baryons is lower than that of creating mesons due to the higher masses of the baryons. If the quark or antiquark emits a gluon this will cause a kink in the colour string, which will gain kinetic energy in the direction of the gluon. In the hadronization process this leads to an additional jet so that a three jet event will be observed.

The cluster fragmentation model

The cluster fragmentation model [18] contains two steps. In the first step primary clusters are created which, in the second step, decay into secondary clusters or directly into hadrons.