either represent a single hadron resonance that converts directly into a physical hadron with a definite mass, or else fragments through a two-body decay into a pair of final-state hadrons. From the particle spectra obtained in e^+e^--annihilation experiments it appears that quasi-two-body final states are universally dominant, so that the latter possibility seems favored if kinematically allowed.

We adopt the cluster fragmentation scheme of Refs. [38, 39], however with some modification concerning heavy clusters. We assume that each cluster $C = \chi, U$ can decay by either one of the following mechanisms:

(i) If a cluster C is too light to decay into two hadrons, it is taken to represent the lightest single hadron (meson) h, corresponding to its partonic constituents, $C \rightarrow h$, with its mass shifted to the appropriate value by adjusting its energy through exchange with a neighbouring cluster.

(ii) If, however, a cluster is massive enough to decay, it decays isotropically in its rest frame into a pair of hadrons (mesons or baryons), $C \rightarrow h_1 + h_2$ according to the decay probability specified below.

Occasionally it occurs that a cluster comes out very heavy, in which case isotropic 2-body decay is not a reasonable mechanism any more. In this case we impose the constraint that, if a cluster is heavier than a critical threshold $M_{crit} = 4$ GeV, then it is rejected and the two recombining partons of that potential cluster propagate on as individual quanta, and continue to participate in the parton cascade process, either until they have decreased their virtuality sufficiently, or until they recombine with a lower-mass partner.

To implement this scheme, we observe from eqs. (48) and (49) that the cluster-hadron transformation can proceed through the scalar channel $\chi \rightarrow h$, or via the pseudoscalar channel $\chi \rightarrow U \rightarrow h_1 h_2$, depending on the corresponding density of states with masses below the decaying cluster. We assume a Hagedorn [40] density of states

$$\rho_h(m) \;=\; c\, m^{-a}\, \exp\left(-\frac{m}{T_0}\right) , \tag{69}$$

where c, a are constants and T_0 is the Hagedorn temperature with the typical values $c = 8m_\pi^2$, $a = 3$ and $T_0 = m_\pi$. The decay probability of a cluster with mass $m_C = \sqrt{p^2}$ to decay into a hadron state of mass $m_h' = \sqrt{p'^{\,2}}$ is then given by

$$\Gamma_{C\rightarrow h}(p, p') \;=\; \frac{1}{N_C(p^2)}\, T_C(p^2) \int_{m_h'=\sqrt{p'^{\,2}}}^{m_C=\sqrt{p^2}} dm\, \rho_h(m) \; . \tag{70}$$