



Figure 1.4: Experimental verification of $SU(3)$ as the gauge group of QCD from four jet events measured at LEP. N_c , C_F , and T_F are properties of the group structure functions f and generators T defined by $f^{abc}f^{abd} = \delta^{cd}N_c$, $(T^a T^{\dagger a})_{ij} = \delta_{ij}C_F$, and $\text{Tr}(T^a T^{\dagger b}) = \delta^{ab}T_F$, where repeated indices are summed over. Groups with $N_c \neq 3$ are excluded by decay ratios while $SO(3)$ and $U(1)_3$ do not have the correct ratios of group theoretic factors. Figure adapted from [44].

1.3 QCD Phase Diagram

The possibility of a new state of nuclear matter accessible through the collisions of heavy nuclei has a long history (see [67] and references therein). From