in the jet energy E' determined from the p_{T} of the photon and the position of the balancing jet using $E' \equiv p_{\mathrm{T}}^{\gamma}/\sin\theta^{\mathrm{jet}}$as both p_{T}^{γ} and the direction of the jet are accurately measured and thus E' provides a better estimate of the jet energy than the direct jet energy measurement by the calorimeter. It is preferred over jet p_{T}, as the calorimeter response depends on the energy of the incident particles and thus parametrization of calorimeter response in E' is more natural.

The EM calorimeter is calibrated using the electrons from Z boson decays such that the reconstructed Z boson mass is equal to the world average [39]. The EM calorimeter response to electrons and photons is similar, but not the same, as photons start their shower later than electrons. This difference is small and is evaluated using simulated events at $p_{\mathrm{T}} = 100$ GeV/c. The estimated uncertainty on the photon energy scale is 0.5% at low E' and 0.8% at high E'. Using this procedure, the DØ collaboration has achieved a 1% accuracy on the jet energy scale in photon-jet events. The current statistics of the γ+jets sample limit the direct measurement of the jet energy corrections in the central region to $E' < 350$ GeV. The response is extrapolated to higher energies using Monte Carlo, which has been tuned to the data. The correction to a single jet with a given algorithm and size is deduced from R_{had} using simulated events.

The calorimeter response to jets depends on their flavor, as the particle spectrum and multiplicity for quark-initiated and gluon-initiated jets are different. The jet energy scale corrections determined from γ+jet events is valid only for the flavor composition of γ+jet events. Event topologies with different flavor composition will have different jet energy scale corrections. Indeed, DØ tuned the single-pion response in their detector simulator to data and used PYTHIA to generate photon-quark, photon-gluon and dijet events. They found that the gluon jet response was 8(2)% lower for jets with 20(500) GeV of energy. In QCD jet production, the fraction of gluon-initiated jets changes with jet p_{T} and the corrections were adjusted to account for this variation in flavor composition. With these additional corrections, the uncertainty on the jet energy scale is reduced to an unprecedentedly-small value.

b. **Jet Corrections using Single Particle Response:** Another approach to determine the jet energy correction is based on a knowledge of the calorimeter response to each particle that makes up a jet. The CDF collaboration measured the calorimeter response to charged hadrons and electrons using both $p\bar{p}$ collider and test beam data. The calorimeter