High-E_T Jet Calibration

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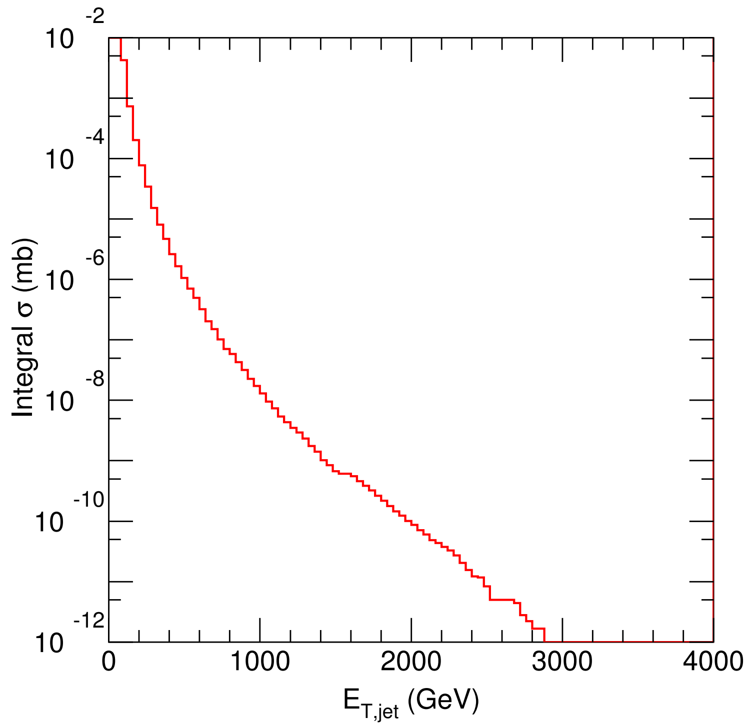
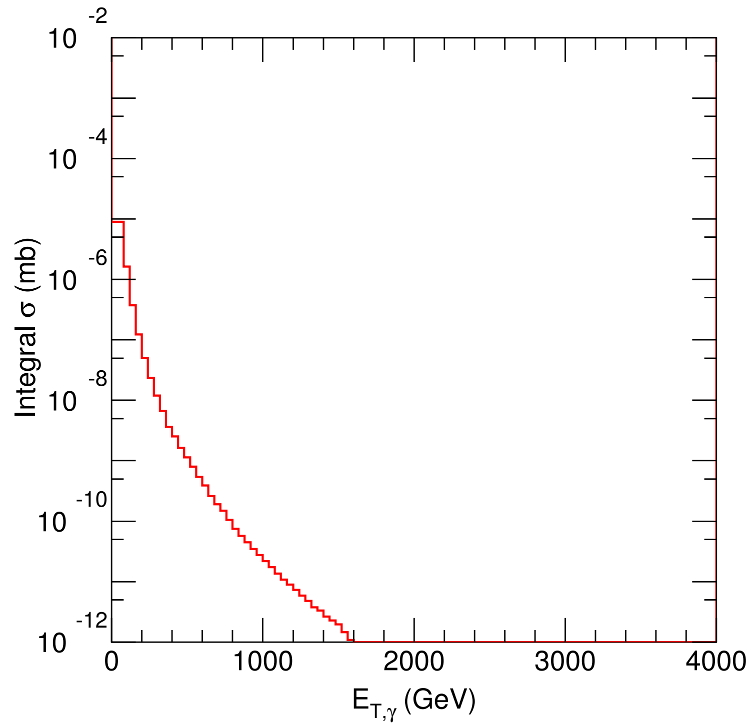
In-situ calibration typically involves balancing jet(s) against EM object. But E_T range for jets is $2-4$ times larger. Compare jets and single γ's (parton level, LO QCD, CTEQ5L):





ATLAS

Suggestion made to balance hard jet with N soft ones. Rate probably small. Estimate using ALPGEN QCD sample, based on LO QCD $N \leq 5$ jet matrix elements matched to parton showers. Currently being generated — very painfully [Shoji Asai, et al.].

Alternative is to balance one hard jet with two softer ones and bootstrap. Larger rate and less pathological events, but errors will compound.

Any such scheme must face differing mixes of quark and gluon jets. Gluons radiate more $\left(c_A/c_F = \frac{9}{4}\right)$ so are softer, have larger e/h effects.

Current H1-style calibration derived from (mostly gluon) Pythia QCD jets works for other samples, including (mostly quark) Herwig SUSY jets, at few percent level, at least for $E_T \gtrsim 50\,\mathrm{GeV}$.

Have not yet achieved calibration at claimed $< 1\%$ level even for Monte Carlo against itself.