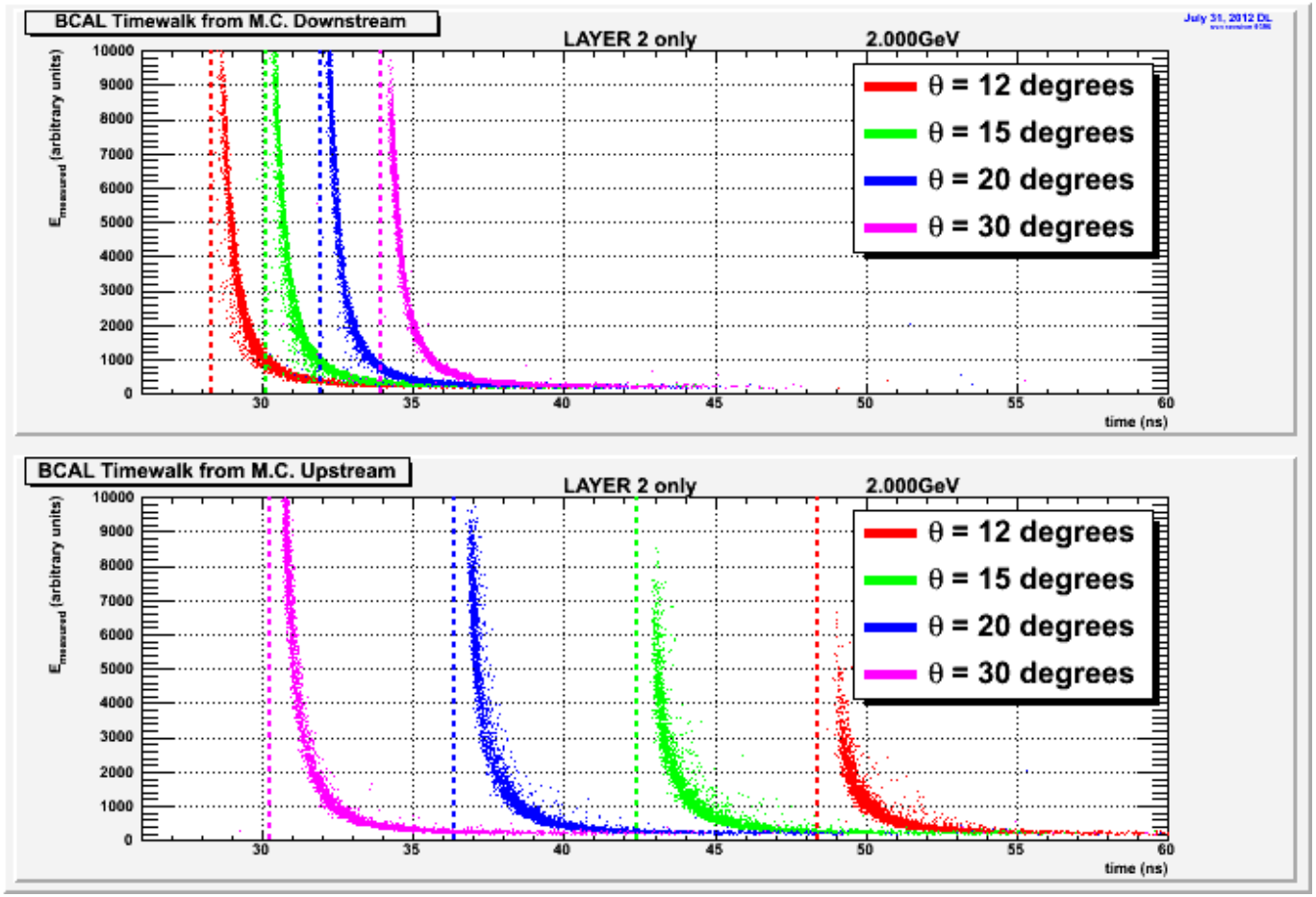
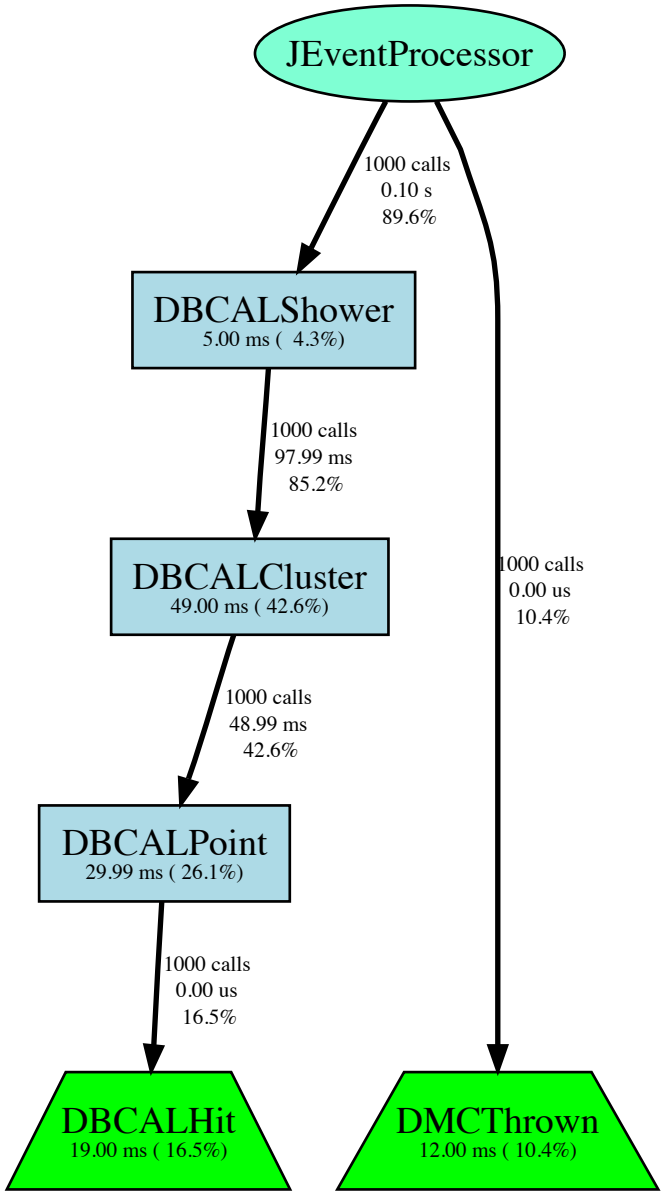
Leading Edge Timing Distributions

- Some discussion about timing distributions last week.
- Calculated times based on time-of-flight and light propagation speed in BCAL
- Wiki page put up explaining it. Seems to be understood now.





JANA factory dependency graph for low-level reconstruction used in current study. (generated by janadot plugin)

Reconstruction

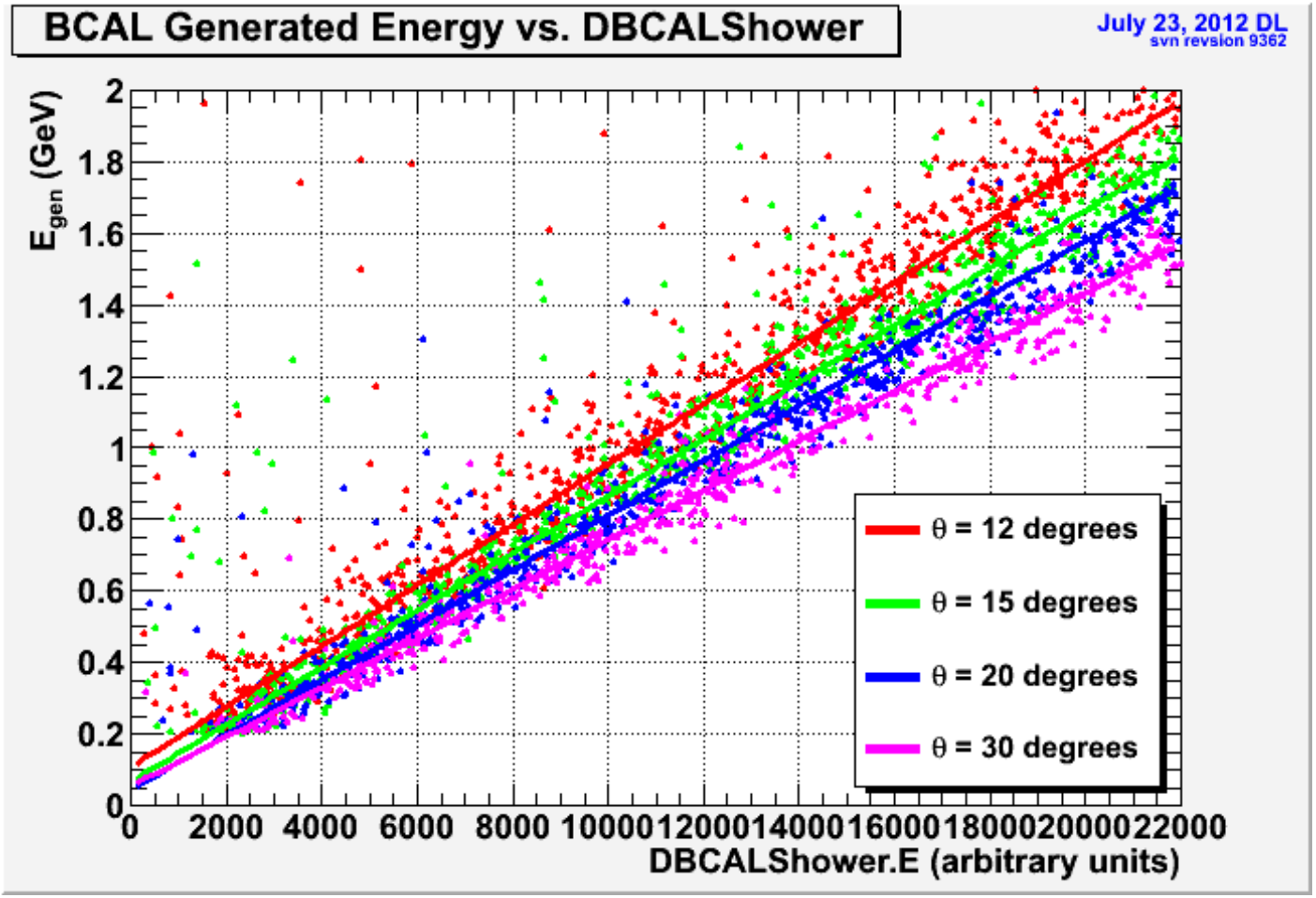
Reconstruction shown here are obtained using the Indiana Univ. (IU) algorithm which is the default for *DBCALShower*

…BUT…

The higher-level reconstruction factories (*DChargedTrackHypothesis* and *DNeutralShower*) explicitly call the KLOE algorithm still

This will be corrected soon.

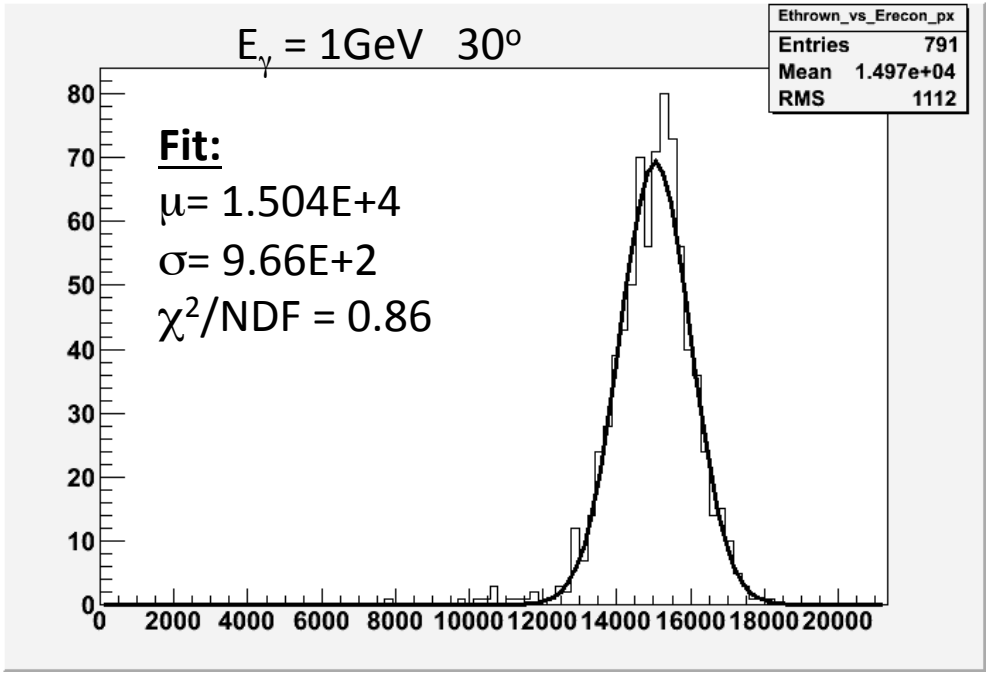
Angular Dependence of Energy Calibration



Energy calibration depends on incident angle of incoming photon

For the

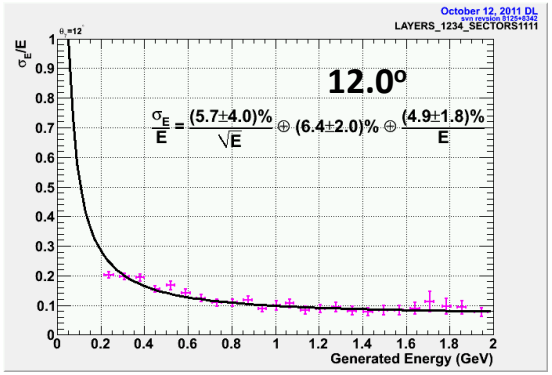
Energy Calibration



- 36 Data sets generated with mono-energetic photons and discrete angles.
- Reconstructed energy for each data set fit to Gaussian
- Mean is used to normalize σ
- Dark hits "pedestal" not subtracted so σ's are slightly smaller than they should be

Slide shown October 24, 2011

Energy Resolution

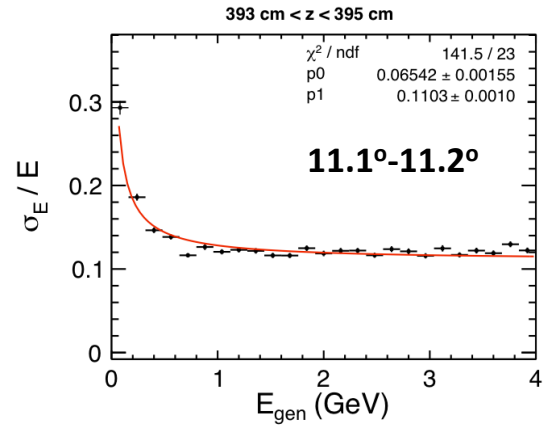


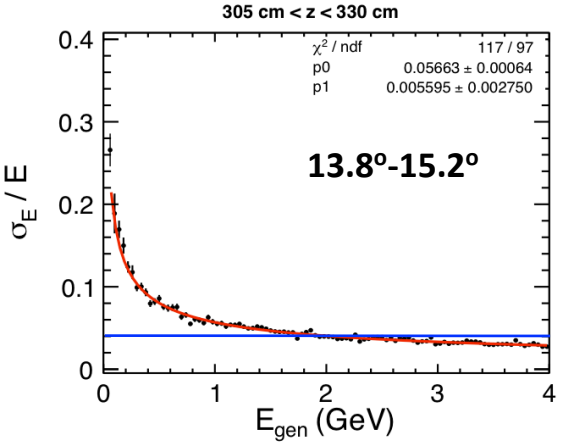
The simulation was modified:

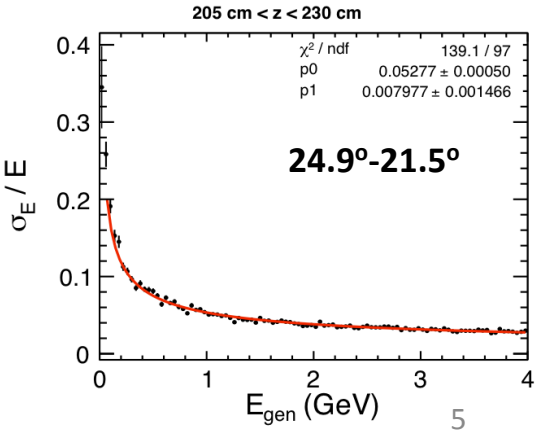
- Removed explicit adding of floor term in smearing due to sampling fluctuations
- Reduced fADC threshold so that it no longer matched TDC threshold (~factor of 5)

n.b. Blake's simulation did indicate large floor term in forward direction, possibly due to leakage through downstream end

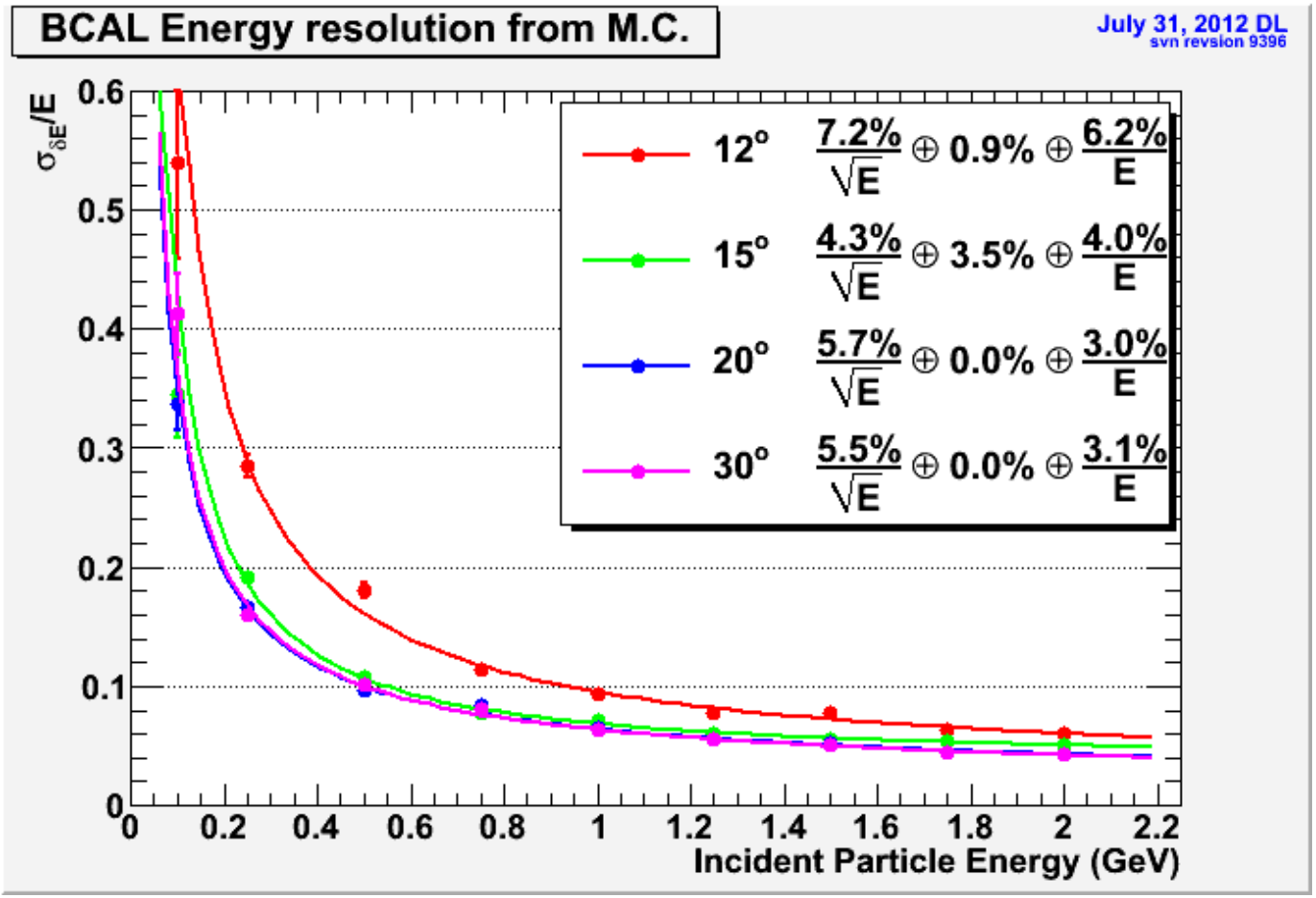
Plots from Blake's thesis







Energy Resolution



Blake's Simulation Results

11.1°-11.2°
6.5%/√E + 11.0%

13.8°-15.2°
5.7%/√E + 0.6%

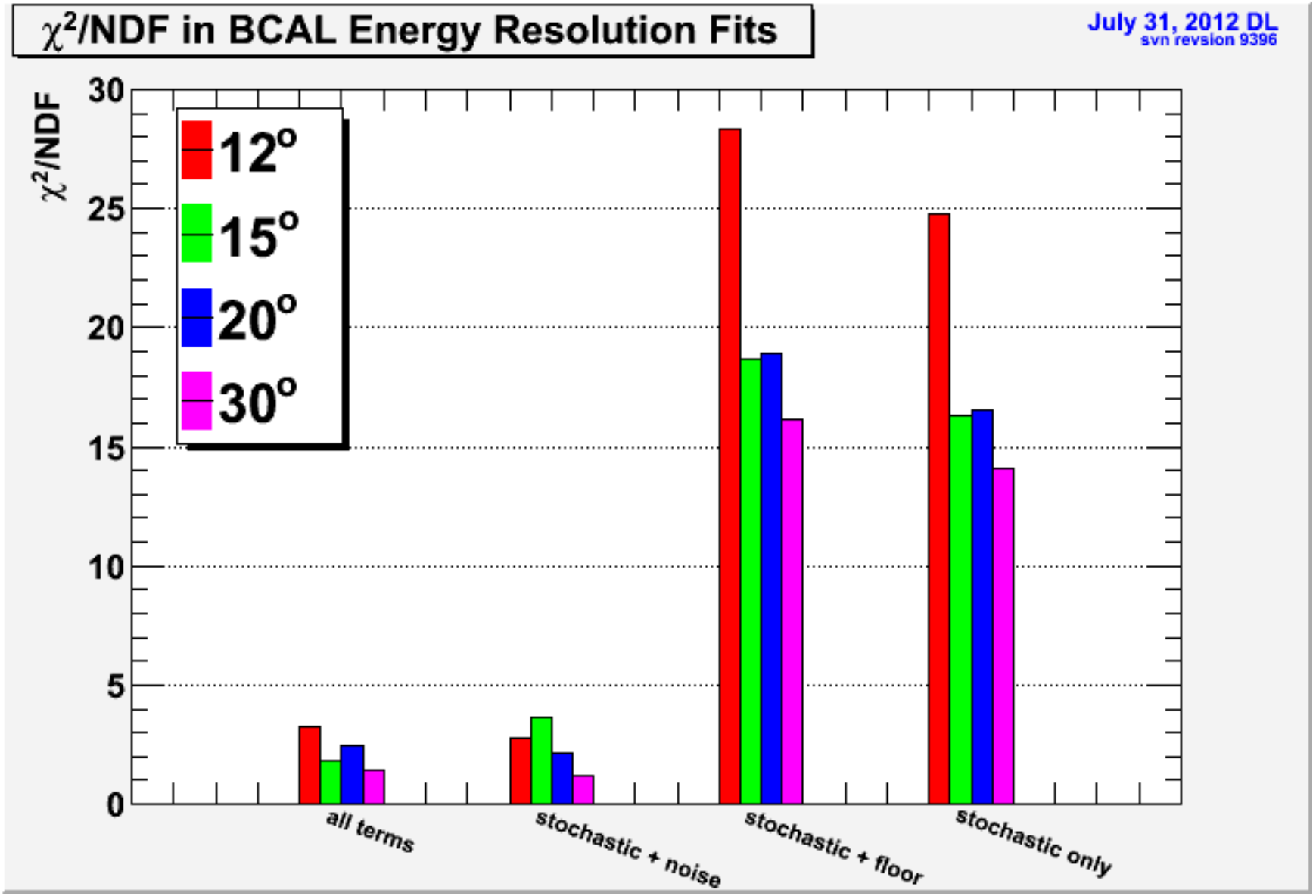
24.9°-21.5°
5.3%/√E + 0.8%

From PDG:

1/sqrt(E) = stochastic
(shower fluctuations, photo-statistics, pre-shower material, sampling fluctuations)

Constant or "Floor" term
(detector non-uniformity, calibration uncertainty)

1/E = noise
(electronic noise)


χ²/NDF in BCAL Energy Resolution Fits
July 31, 2012 DL
svn revsion 9396
χ²/NDF
30
25
20
15
10
5
0
12°
15°
20°
30°
all terms
stochastic + noise
stochastic + floor
stochastic only

Summary

- Work continues on the simulation/smearing code for the BCAL
- Energy resolution has strong dependence on noise (1/E) term
- Implementing new scheme into base reconstruction will require development of energy and timing calibration code