DC1 Energy Evaluation
Data Sample:
100 MeV γ's within $5^\circ$ ON-AXIS

Cuts:
1) CalCsIRLn > 2.
2) CalEnergySum > 5
3) CalTwrEdge > 50
4) TkrTwrEdge > 35
5) TkrEnergyFrac < .7

NOTE: Edge Cuts kill ~ 32% of Events

- Same input Data
- Suspect that Edge Cuts made

Evidently THINGS HAVEN'T CHANGE MUCH - Memories are better then REALITY!

FWHM = 35 MeV ($\sigma = 14.8\%$)
New Approach:
1) Previous method relied on building corrections from basic principles. This proved to be complex.
2) Try a "Global" approach:
   - Know energies fall off near edges
     JUST FIT IT
   - Know there are 3 intertwined pieces
     TrkEdges, CalEdges, Cal-Leakage
   - Choose limiting cases to fit each

Step 1:
  Fix the contribution of TkrBlankHits.
  - Select Events which start in last Layer (limited Event Sample)
  - Fit ThickHits, BlankHits, and Excess RL to missing energy
    (NO CAL CORRECTIONS - Leakage small & far from edges)

Definition of TkrExcessRLn:
TkrRadLength - (0.045*TkrNoThinLayers + 0.195*TkrNoThickLayers)/(Tkr1ZDir)
Independent Var's Used in Blank Hits Fit

Counts = 306
Mean = 0.125
Stdev = 0.00269

Counts = 306
Mean = 2.48
Stdev = 0.582

Counts = 306
Mean = 5.57
Stdev = 1.48

Counts = 306
Mean = 0.0599
Stdev = 0.0184
Tkr1FirstLayer > 14
- 100% Error

Tkr1FirstLayer > 13
- 45% Error
Question: Why Energy/Hit SO BIG??

Tkr1FirstLayer > 12
115% Error
Choose to use 
.2 MeV/BlankHit

This was the largest before 
Effect was deleterious to 
Fits for all Layers

Step 2:
Fix the Coefs for Thick Tracker Layers
  - Same Event selection as before except now allow all Thick Layers
  - Fix the Blank Layer pieces as determined in Step 1
Question:
- Why is the ratio of Thick/Thin = 2 when ratio of RLn's is .195/.045 = 4.3
Results:

Step 3:
Correct Events near CAL Tower Edges
- Starting from above - Observe how energy changes as a function of distance to Tower Edge.
- Require > 70% of the Energy to be in the CAL
CAL Edge Correction for \( \cos(\theta) < -0.996 \) (5°)

\[
68 = 41.3 + 0.559 \cdot S_{\text{CalEdge}} - 0.00335 \cdot S_{\text{CalEdge}}^2
\]

**NOTE:** Correction only applied to CalEnergySum
Now do Tracker Edge Correction
- Similar to above except reverse rolls of Tracker and CAL
  1) Require > 70% of the energy to be in the Tracker
  2) Require CalTwrEdge > 50

NOTE:
  1) Correction only applied to TrkEnergy
  2) Correction almost the same as in CAL!

\[
72 = 44.3 + 0.658 \cdot S_{TkrEdge} - 0.00387 \cdot S^2_{TkrEdge}
\]
Review: Correction Progression

No Edge Cuts
No TkrEnergyFrac Cut
Energy Resolution Dependencies

Resolution Get Worse as
1) TkrEnergyFrac increases
2) Cal Energy Centroid gets near edge
3) Track Head gets near edge
Results as shown at the start of talk

Off Axis Behavior

New Sample of Events:  \(0 < \theta < \pi\)
Expect Correction to "go away" as |cos(\(\theta\))| decreases

\[ \rightarrow \text{Cracks become Gaps} \]

Expect resolution to worsen due to thickening Tracker
(Our Tracker is a POOR CALORIMETER!)
Approximate as 1st Order Correction:
Previous Corrections Become
1+ (cos(θ))*(Correction-1)

See worse energy resolution
10%  ➔  14%

See little dependence on cos(θ)

To Do:
Higher Energies - Need to add Leakage Correction
   - Check Edge corrections (esp. in CAL)