Short description:

From June, 20 till August, 6 we have simulated in 13.0.10 single 822k of π^+, 738k of π^-, 979k of π^0, - i.e. ~ 2.5M of single pions at logarithmic energy scale from 150MeV till 2 TeV.

Second presentation file contains several pictures devoted to:
1. examination of 12.0.6 dead material correction procedure performance on new data
2. attempt to use lookup tables instead of profile histograms
3. several distribution showing weighting and OOC performance from 12.0.6 on new data
(all for charged pions only)

Two energy diapasons were selected:
1. Range 90-120 GeV which gives <E>~100 GeV.
2. Range 9-12 GeV which gives <E>~10 GeV.

While comparing different DM corrections ideal weighting and ideal OOC procedures are used.

Different look-up table configurations were investigated; currently two lookup tables (one for "all material before", another for "all material inside") are used; they have following binning:

$0<|\eta|<5.0$ – 50 eta bins.
$100\ \text{MeV} < E < 2\ \text{TeV}$ – 25 logarithmic energy bins
$0.0 < \lambda < 10000$ – 25 logarithmic lambda bins

Bins contains $< E_{DM}/E_{CLS} >$ calculated with 3 rms tail rejection.

Remarks:

1. EM scale 0-3% off depending on energy and η.

2. Old DM correction have problems around 1.5 crack (underestimation) and around 3.2 crack (overestimation). This could be probably explained by misclassification. Effects are bigger at low energy.

3. Lookup approach more often than not is behind profile approach, the reason of that, especially for η~3.2, is not quite understood. Lack of events, ugly and non-gaussian spectras in one look-up bin, untuned rejection criteria could be the reason.

4. Distributions for E_dm_{reco}/E_dm_{true} (or same for weighting and OOC energies) doesn't seems to be a good tool to control performance. At the same time E_dm_{reco} - E_dm_{true} behavior is similar to behavior of mean reconstructed energy in topo sums and could be a good indicator that something goes wrong.

5. According to this indicator one can say that both current weighting procedure and OOC corrections have a biase in reconstructed energy.

What to do with dead material correction, possible variants:

1. Stop all lookup studies, update coefficients in Athena just using new data, without touching ConditionData and DeadMaterialCorrectionTool.
+ No CVS code changes, back compatibility, time 1 week.
- Anyway it will go only in 13.0.4;
- Will probably still have biases in dead material energy (due to rejection of cells with negative energies).

1. Stop lookup investigations, but implement possibility to use this approach together or instead of profile fits. Update coefficients in Athena for profiles,
+ Should be better performance, especially at low energies
- Changes in ConditionData and DeadMaterialCorrectionTool, incompatibility issues .
- time 3 weeks.