Comparing electron simulations in LCDG4 and Gismo

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DHCal Meetings

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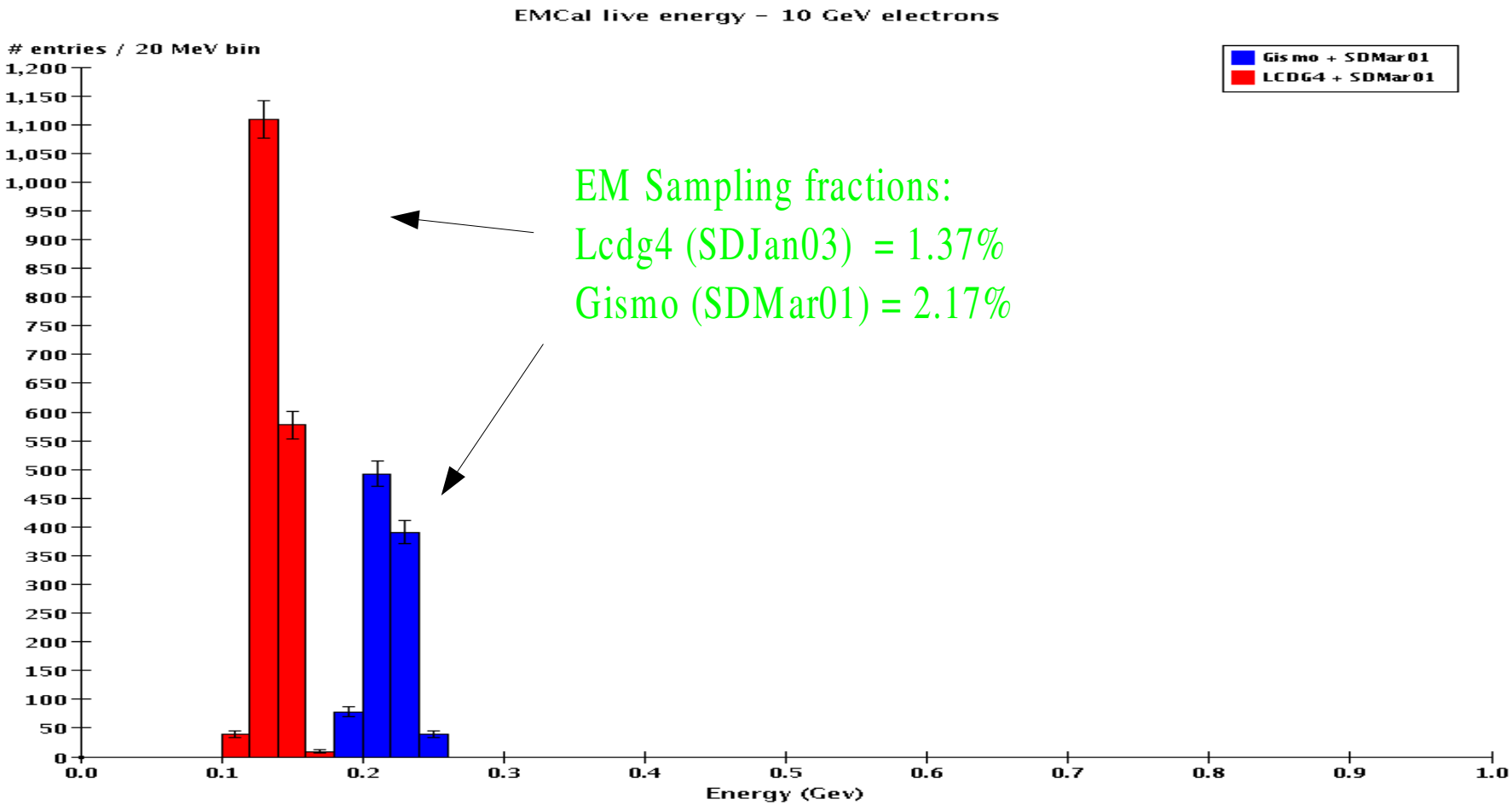
The problem

Differences in EMCal depositions between LCDG4 and Gismo



EM Sampling fractions:

Lcdg4 (SDJan03) = 1.37%

Gismo (SDMar01) = 2.17%

EMCal layering changes

* SDMar01:

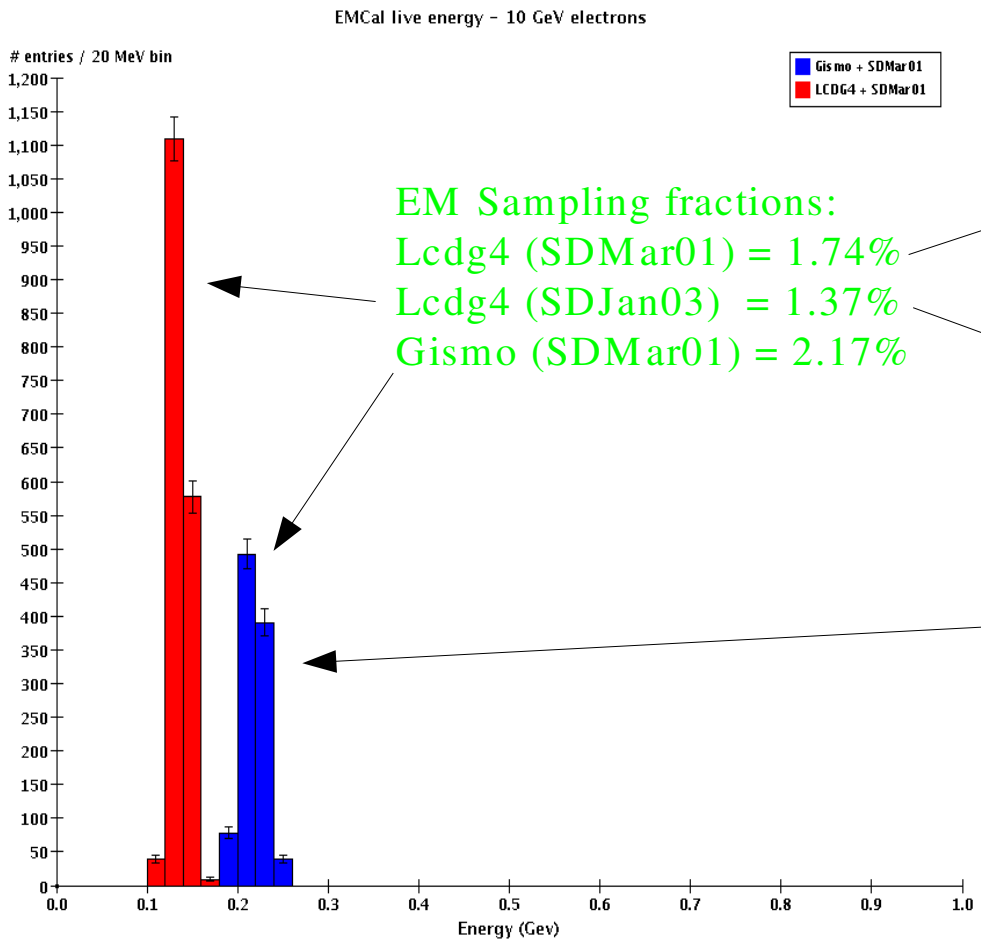
```
----------------------------------------
  <layering n="30">
    <slice material = "W" width = "0.25" />
    <slice material = "Si" width = "0.04" sensitive = "yes" />
    <slice material = "G10" width = "0.2" />
    <slice material = "Air" width = "0.01" />
  </layering>
----------------------------------------
```

* SDJan03:

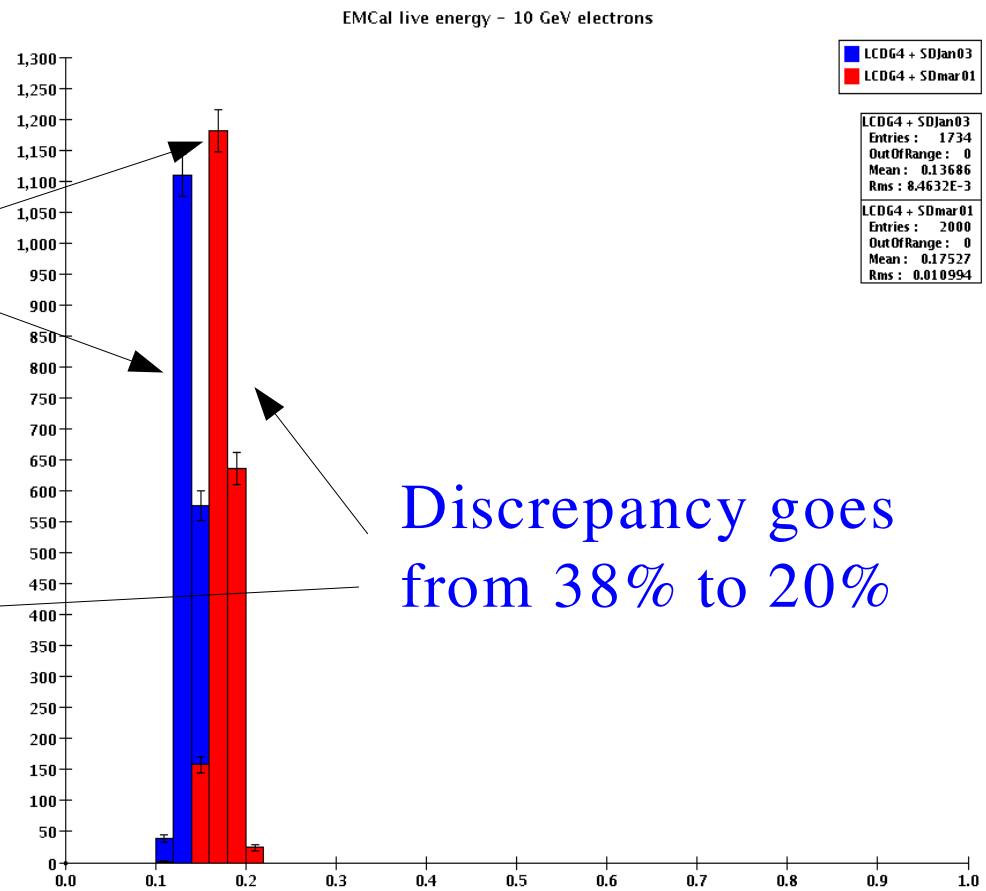
```
----------------------------------------
  <layering n="30">
    <slice material = "W" width = "0.25" />
    <slice material = "G10" width = "0.05" />
    <slice material = "Si" width = "0.04" sensitive = "yes" />
    <slice material = "Cu" width = "0.1" />
    <slice material = "Air" width = "0.06" />
  </layering>
----------------------------------------
```

SDJan03 / SDMar01 Comparison

The effect of the new copper layer in SDJan03

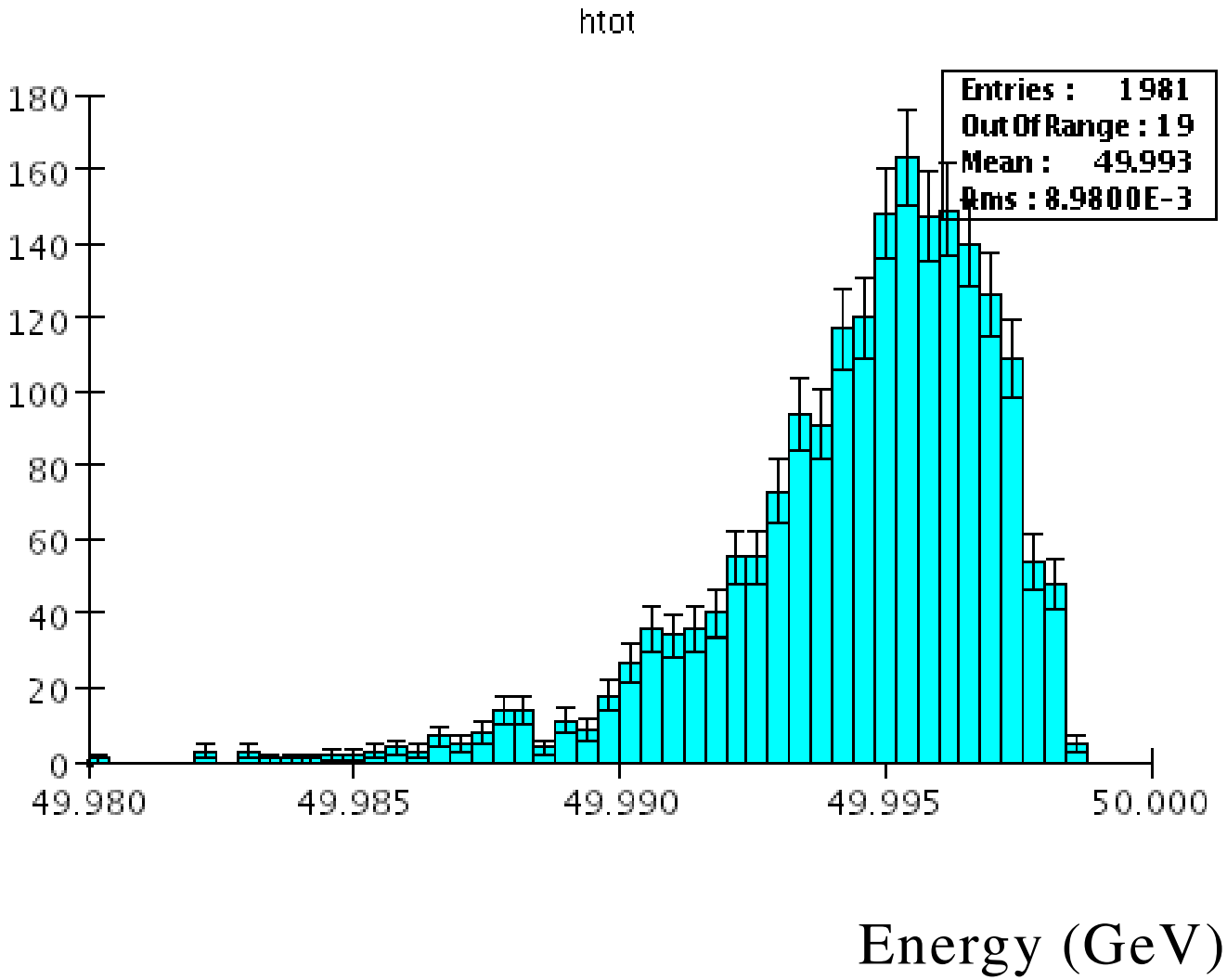


EM Sampling fractions:
Lcdg4 (SDMar01) = 1.74%
Lcdg4 (SDJan03) = 1.37%
Gismo (SDMar01) = 2.17%



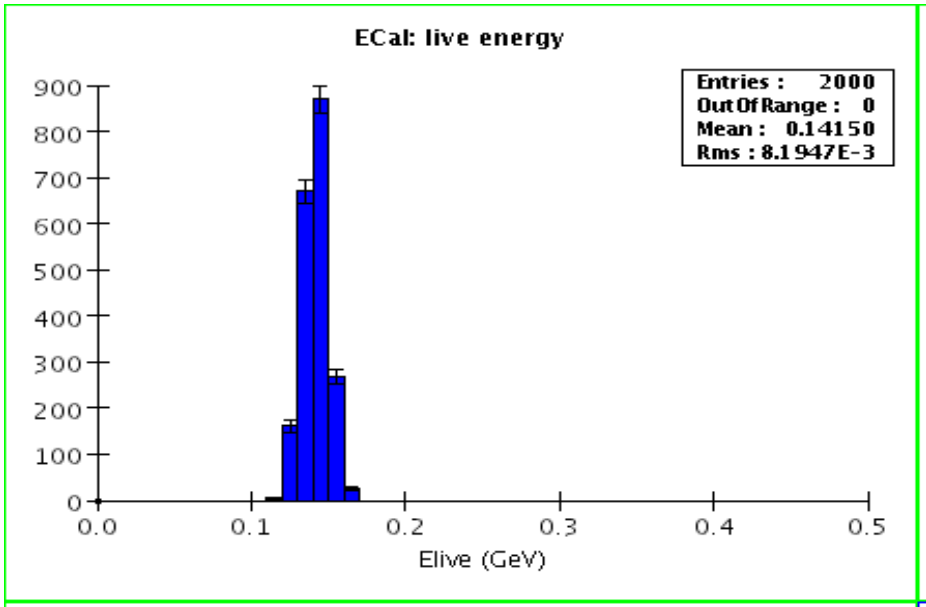
Discrepancy goes from 38% to 20%

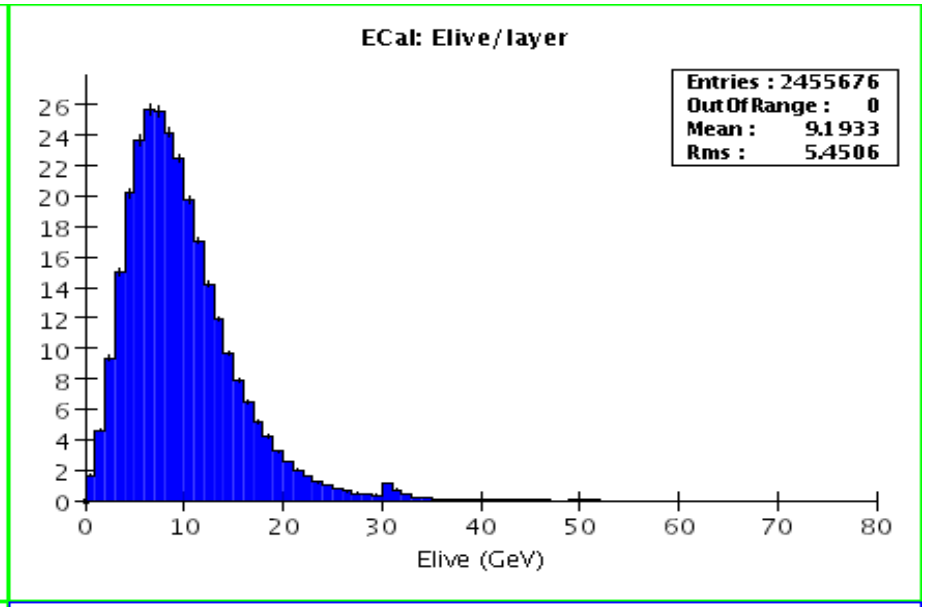
Missing or doubly counted Energy?

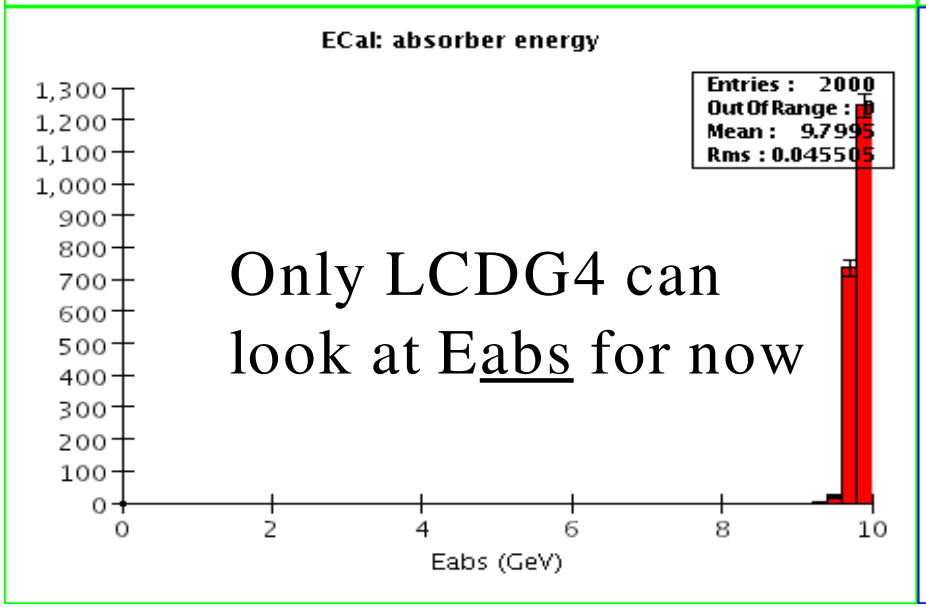


About 7 MeV of energy per 50 GeV electron is lost before the calorimeters

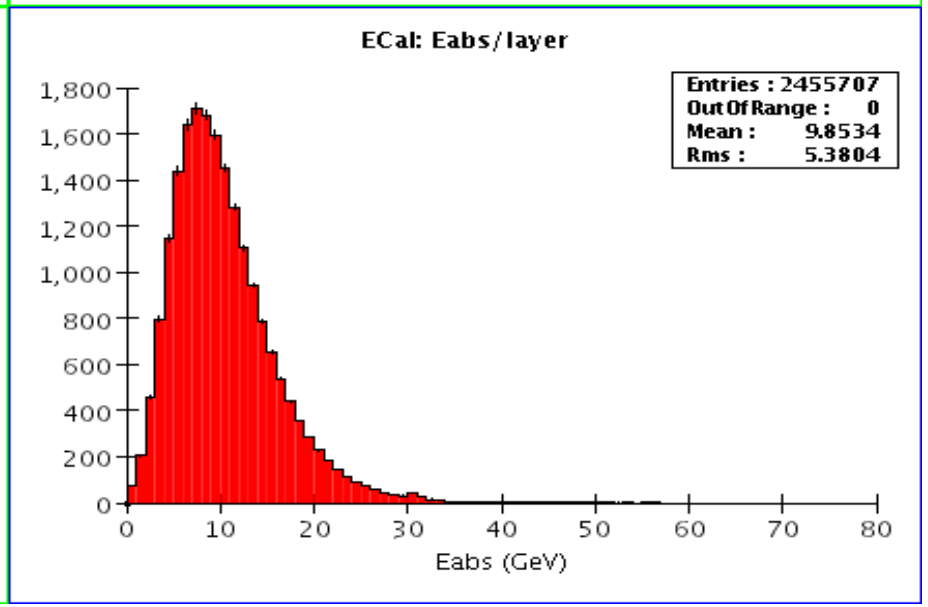
LCDG4: EMCal Elive and Eabs



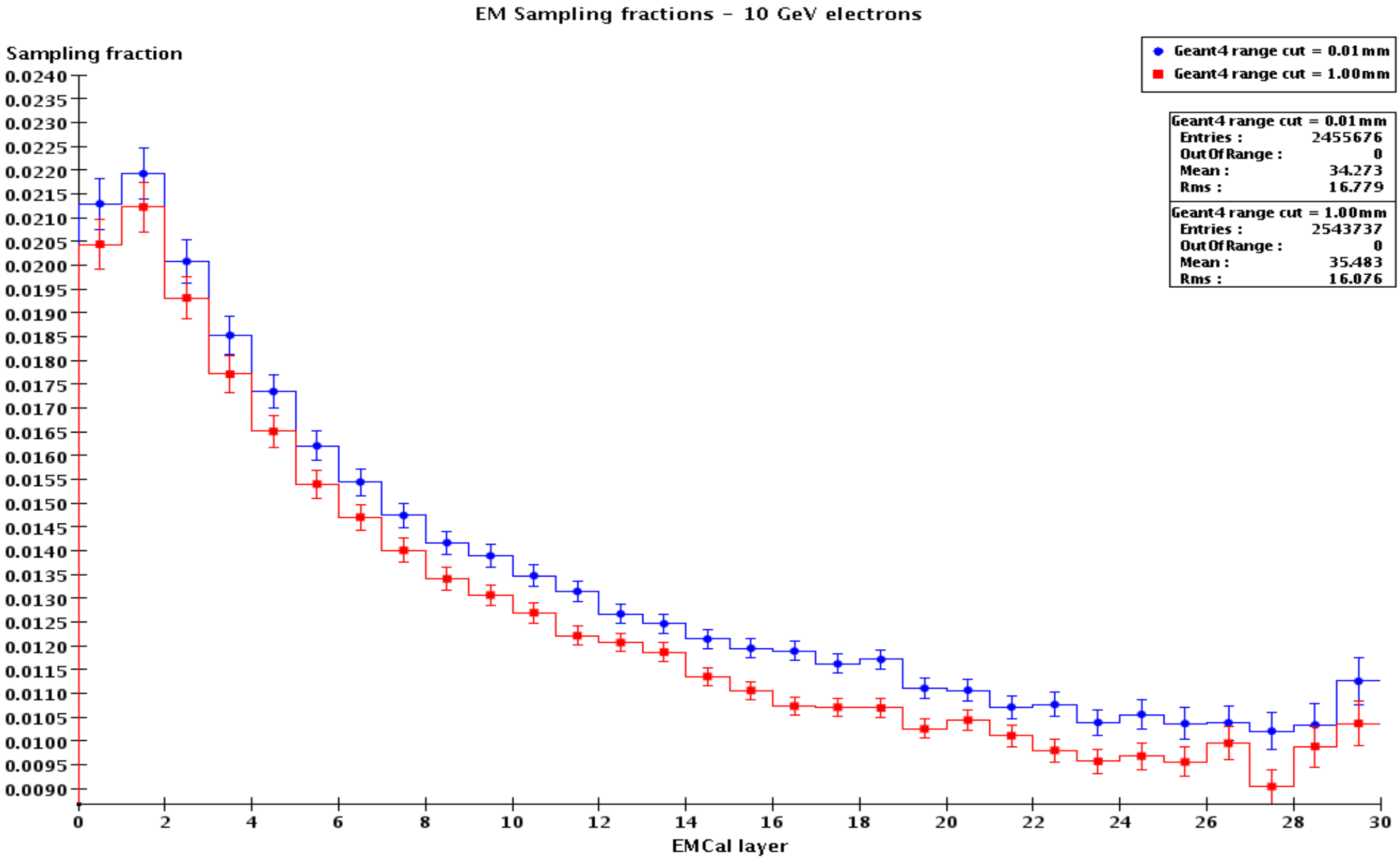




Only LCDG4 can look at Eabs for now



EM Sampling fraction per layer



Summary

- Most of Elive discrepancies are from added copper slab in each layer of ECal (SDJan03)
- Geant4 range cut has small effect (about 4%)
- Still about 20% discrepancy to be understood
- Kuhlman: Ok with 20% discrepancy
- Different radiation lengths for EM layers in LCDG4 and Gismo (absorber vs. active)?
- My personal view: Geant4 is probably more carefully tested than Gismo.

What is next?

- Update momenta for preassigned decay products
- Checks for memory leaks and optimization
- Release, documentation, production
- Compare LHEP, QGSC, QGSP physics lists for hadrons response and processing time
- Projective + Non-projective versions merged
  - Cell IDs in .SIO are not difficult
  - How easy is it to make NP .SIO readable from JAS?
- Visualization improvement (virtual cells)
- LCIO output