Some slides from my LC-Cal talk

"Simulations at NICADD A Status Report"

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DHCal Meeting
March 31, 2004

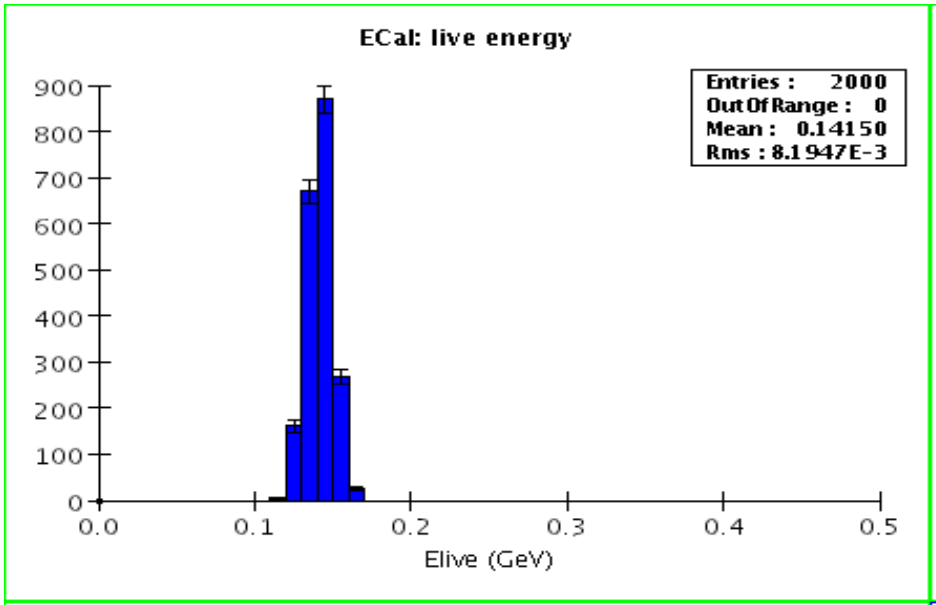
LCDG4: Gismo compliance

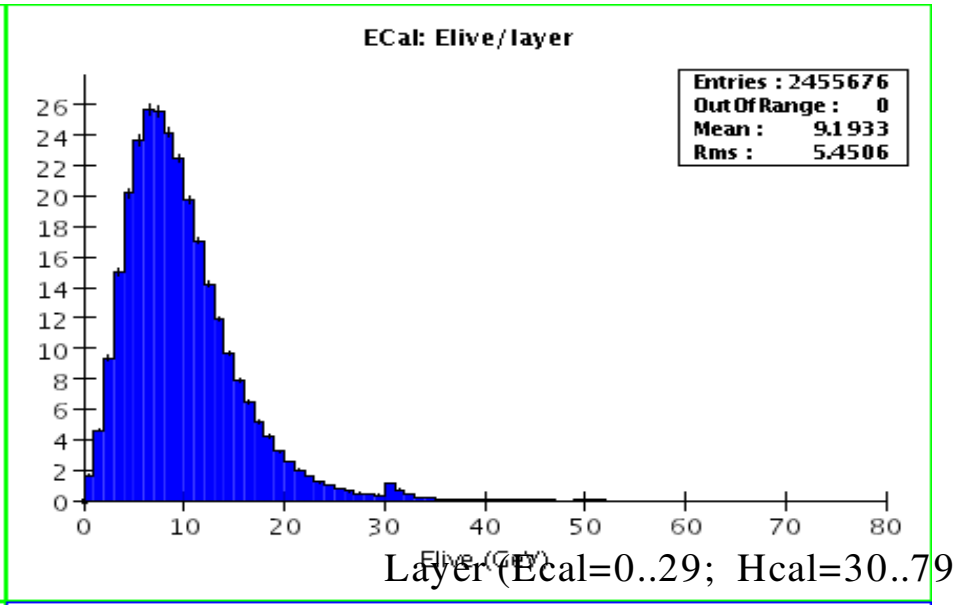
- Hits point to all contributing particles (except tracker hits from calorimeter back-scatterings, as in Gismo)
- Particle status codes
- Starting and ending points
- Correct Monte Carlo hierarchy
- All secondaries properly saved, except for shower secondaries
- Calorimeter entrance point: position and momentum
- Production momentum (ok except for preassigned decay products)

LCDG4: Remaining issues

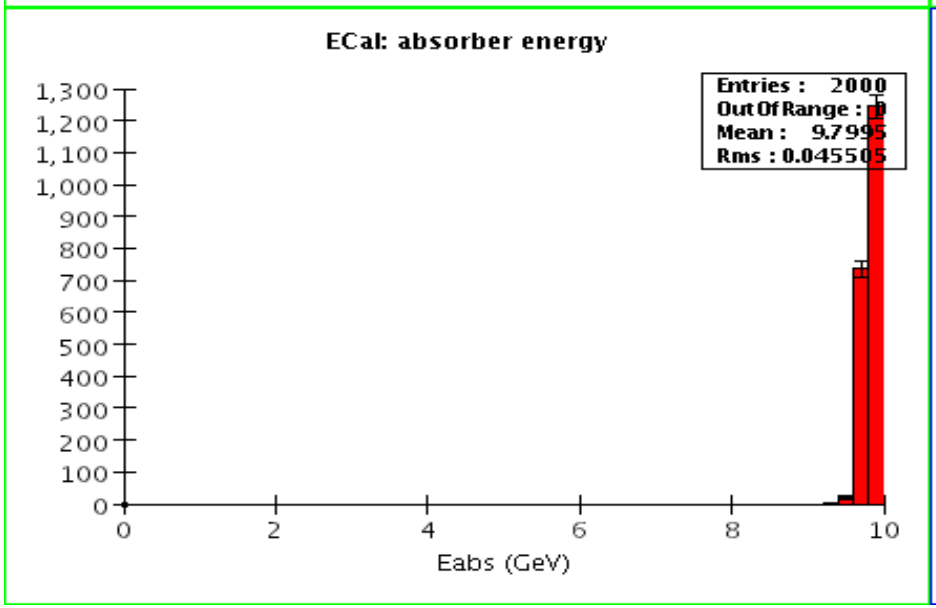
1. Discrepancy in EM live energy (LCDG4 & Gismo)
2. Discrepancy in number of calorimeter hits
3. Large number of HCal hits in the ECal/HCal interface

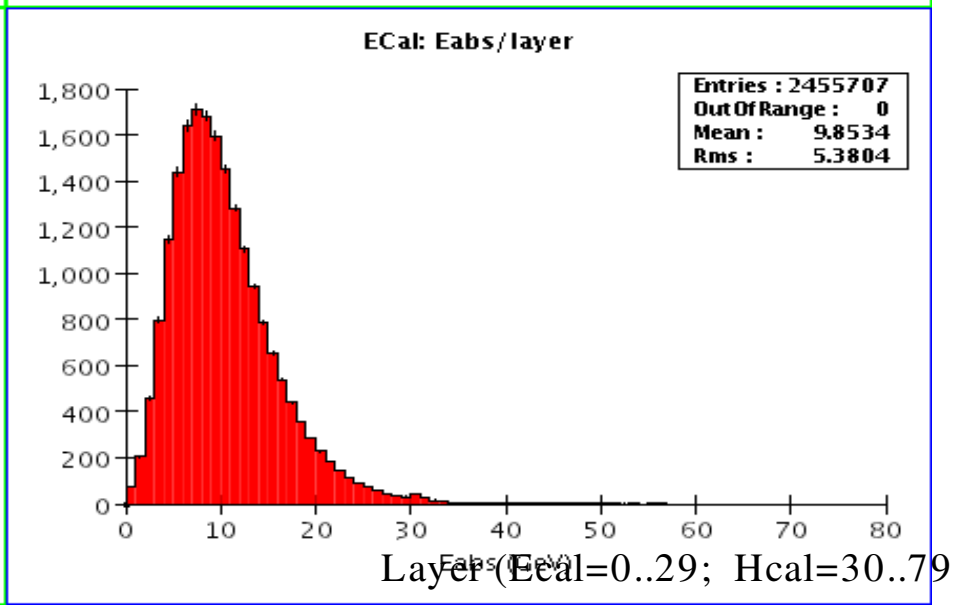
Issue 1: ECal E_{live} and E_{abs}





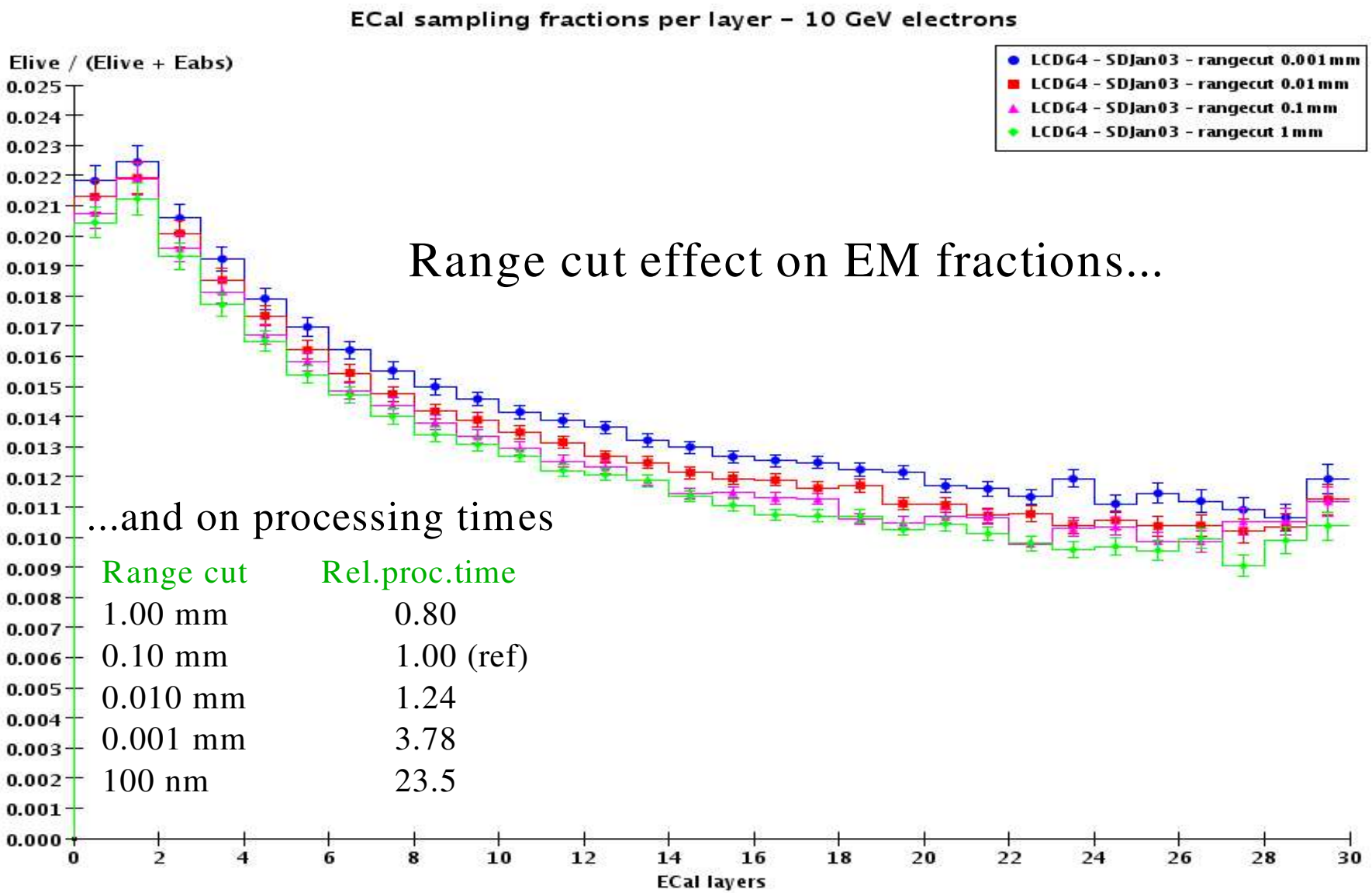
Layer (Ecal=0..29; Hcal=30..79)





Layer (Ecal=0..29; Hcal=30..79)

EM Sampling fraction per layer

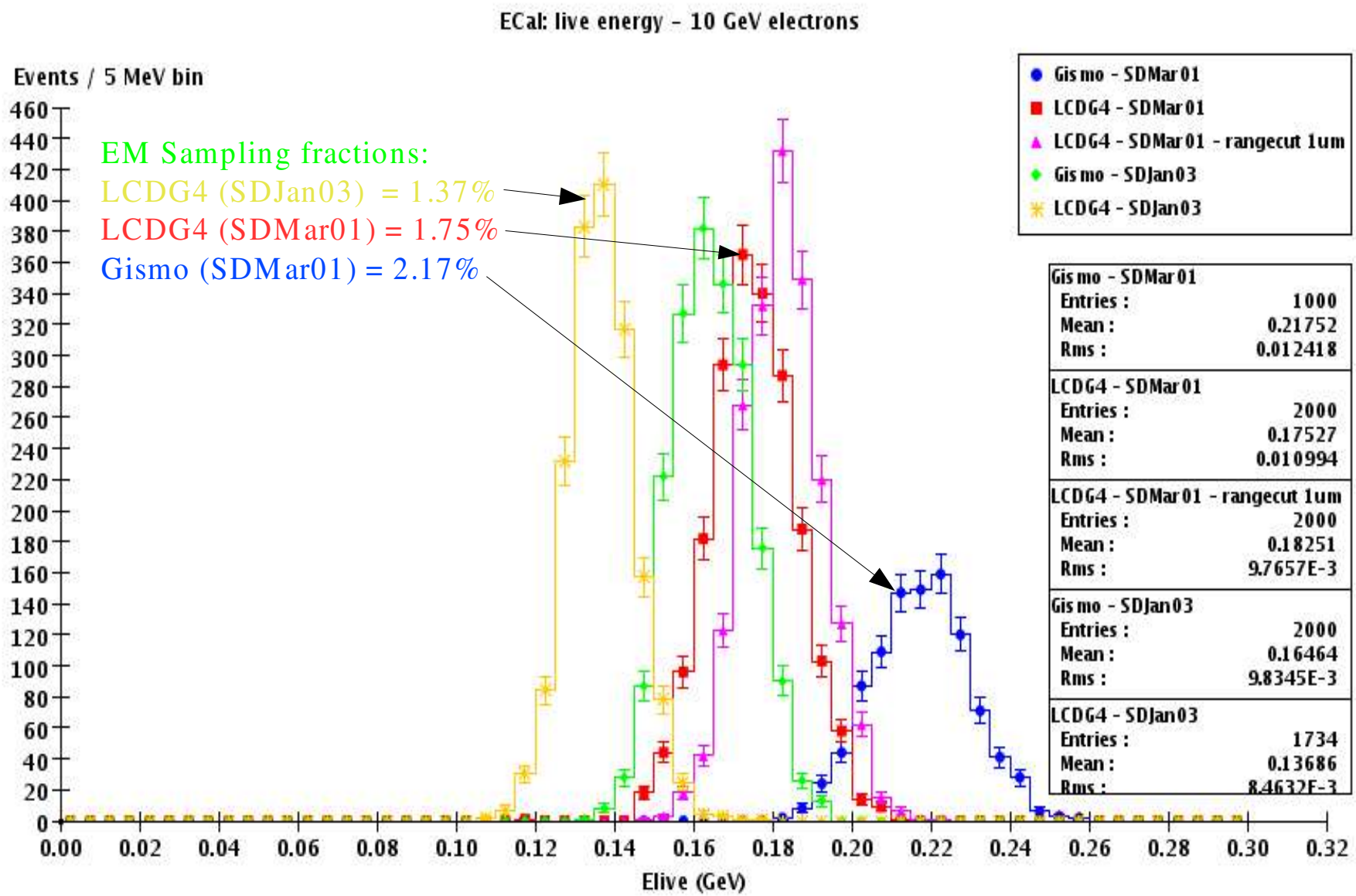


Range cut effect on EM fractions...

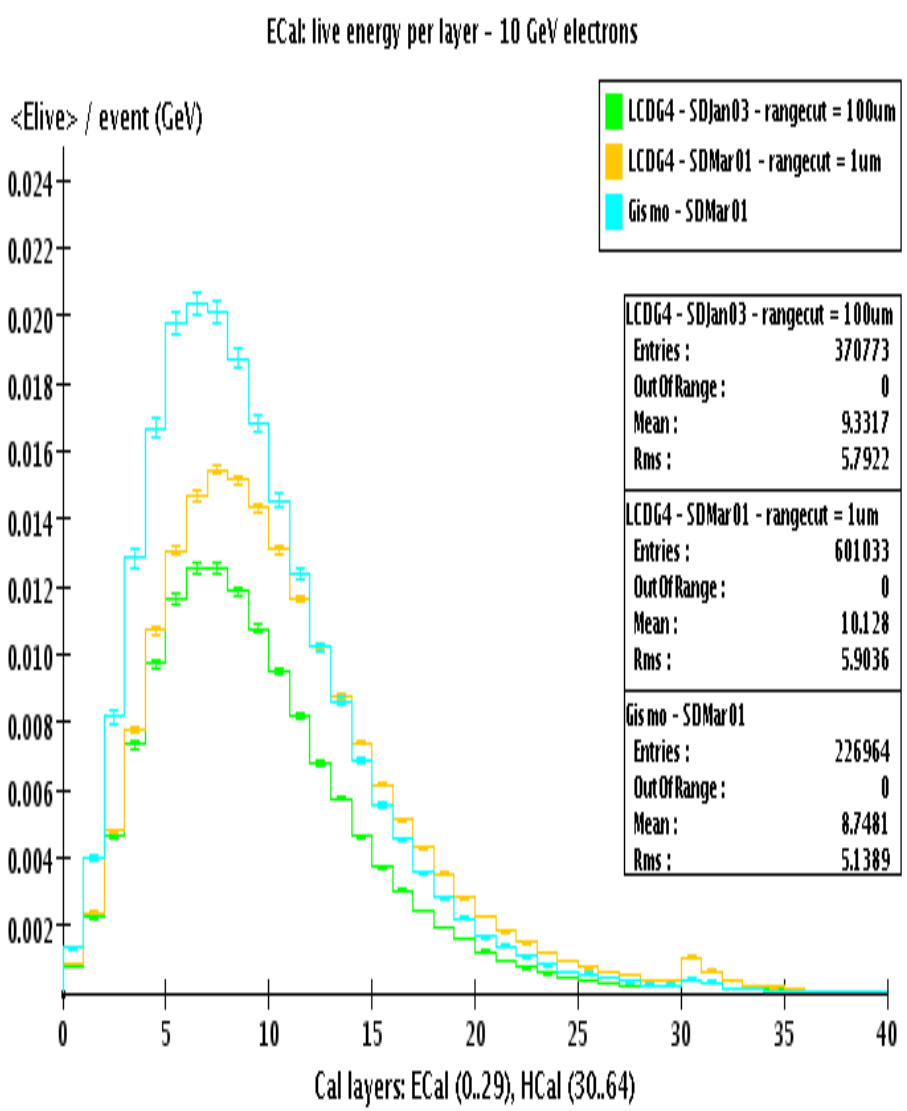
...and on processing times

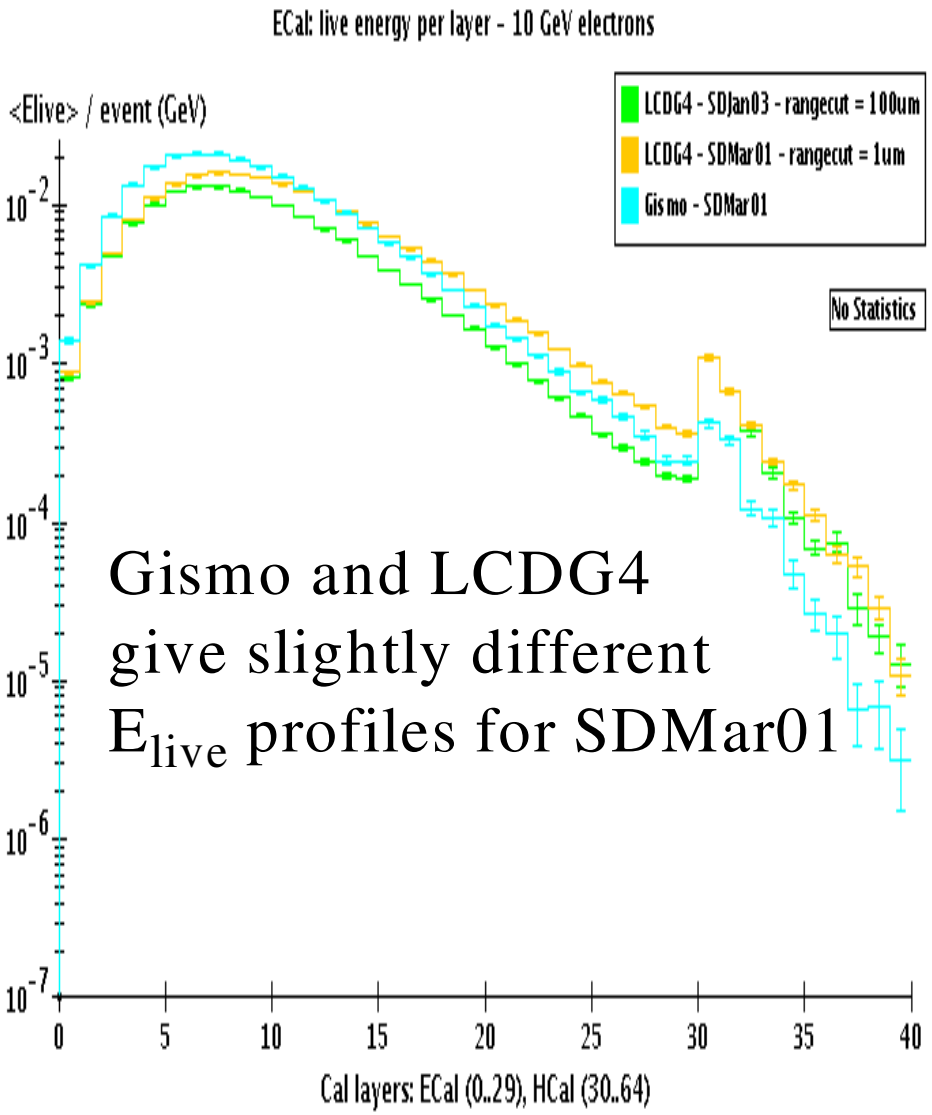
Range cut	Rel.proc.time
1.00 mm	0.80
0.10 mm	1.00 (ref)
0.010 mm	1.24
0.001 mm	3.78
100 nm	23.5

Issue 1: Ecal E_{live}



Issue 1: ECal E_{live} per layer





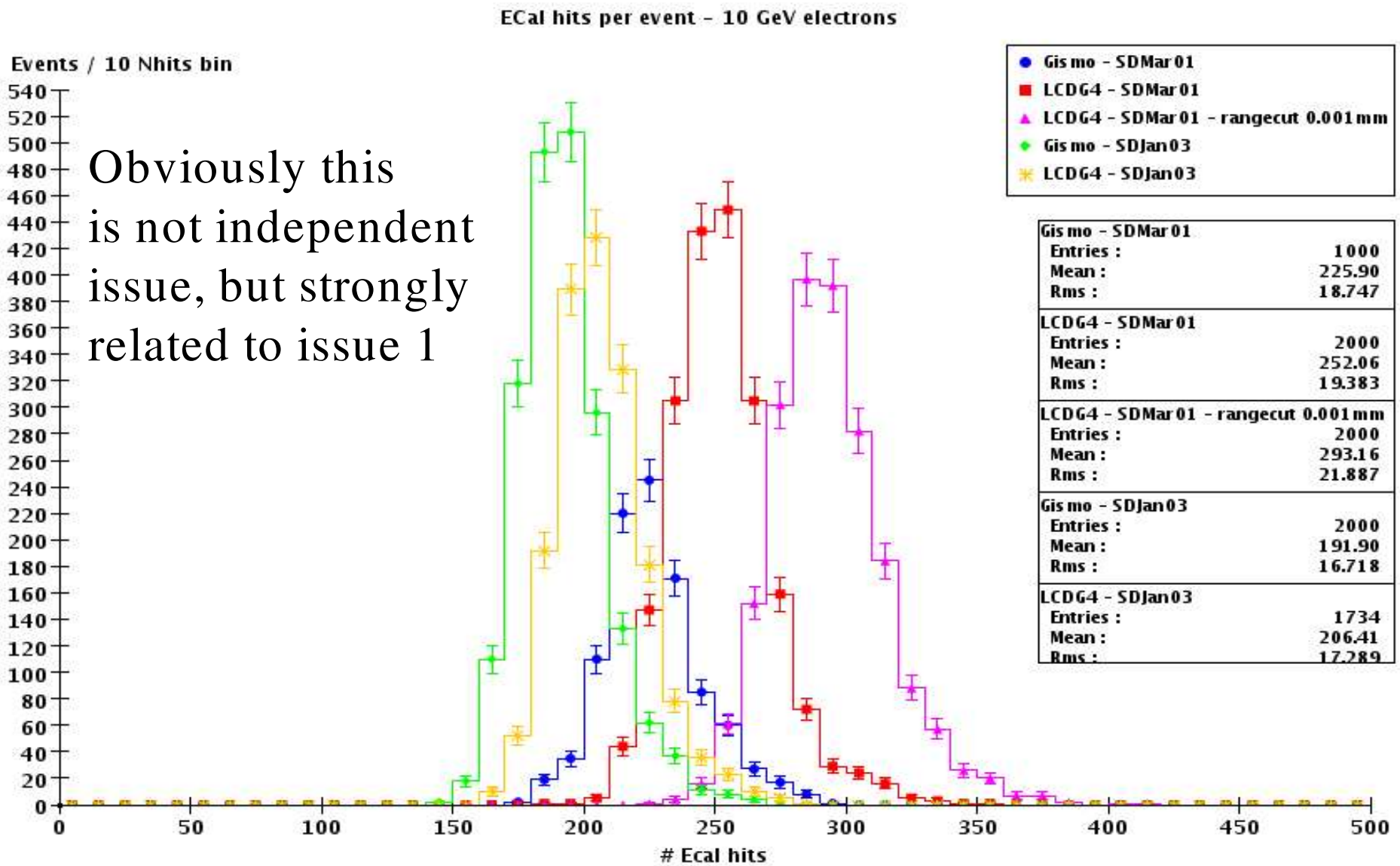
Gismo and LCDG4 give slightly different E_{live} profiles for SDMar01

Issue 1: radiation lengths?

Material	Radiation lengths (cm)			
	PDG	Geant	G4-PDG	Gismo
W	0.35	0.350	0.00%	?
Si	9.36	9.094	2.84%	?
Cu	19.40	16.716	13.84%	?
G10	1.43	1.440	-0.70%	?
Air	30420	30551	-0.43%	?

There are some discrepancies with LCDG4 and PDG, but below the 3% level (SDMar01 has no copper). Maybe Gismo's radlens are different from PDG numbers by more than 10% level?

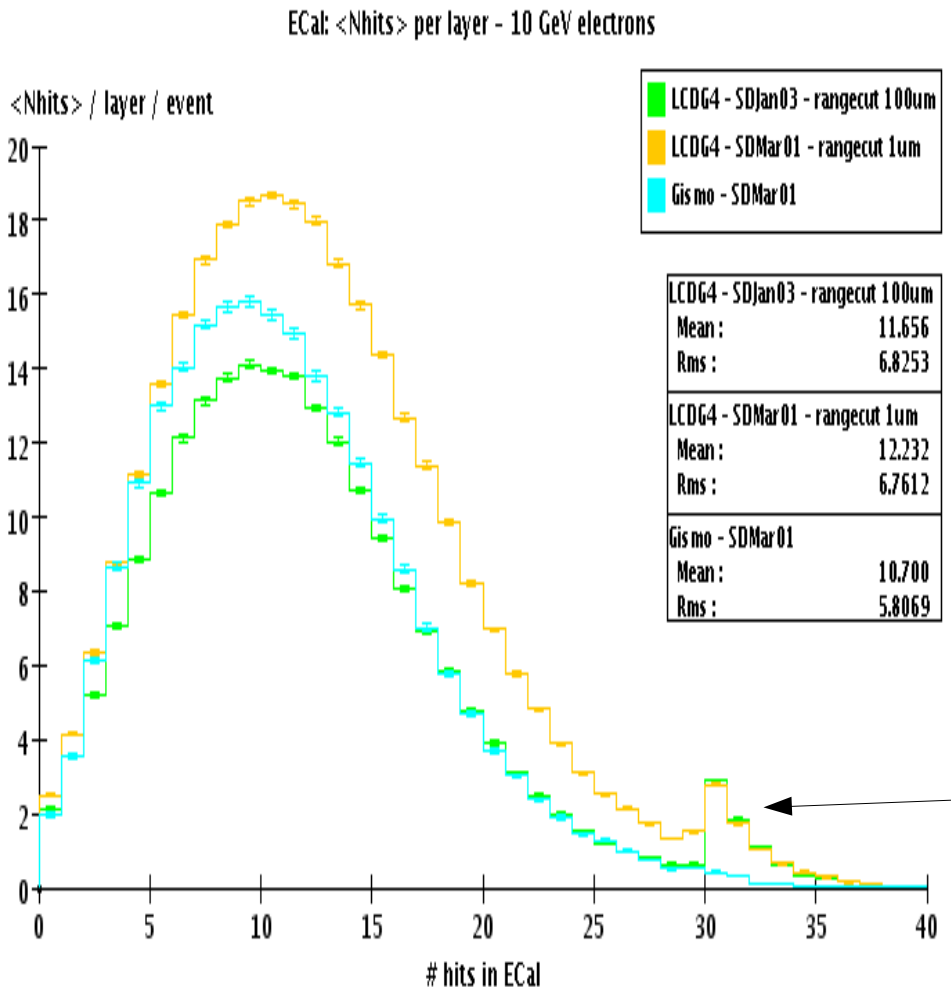
Issue 2: Number of ECal hits per event

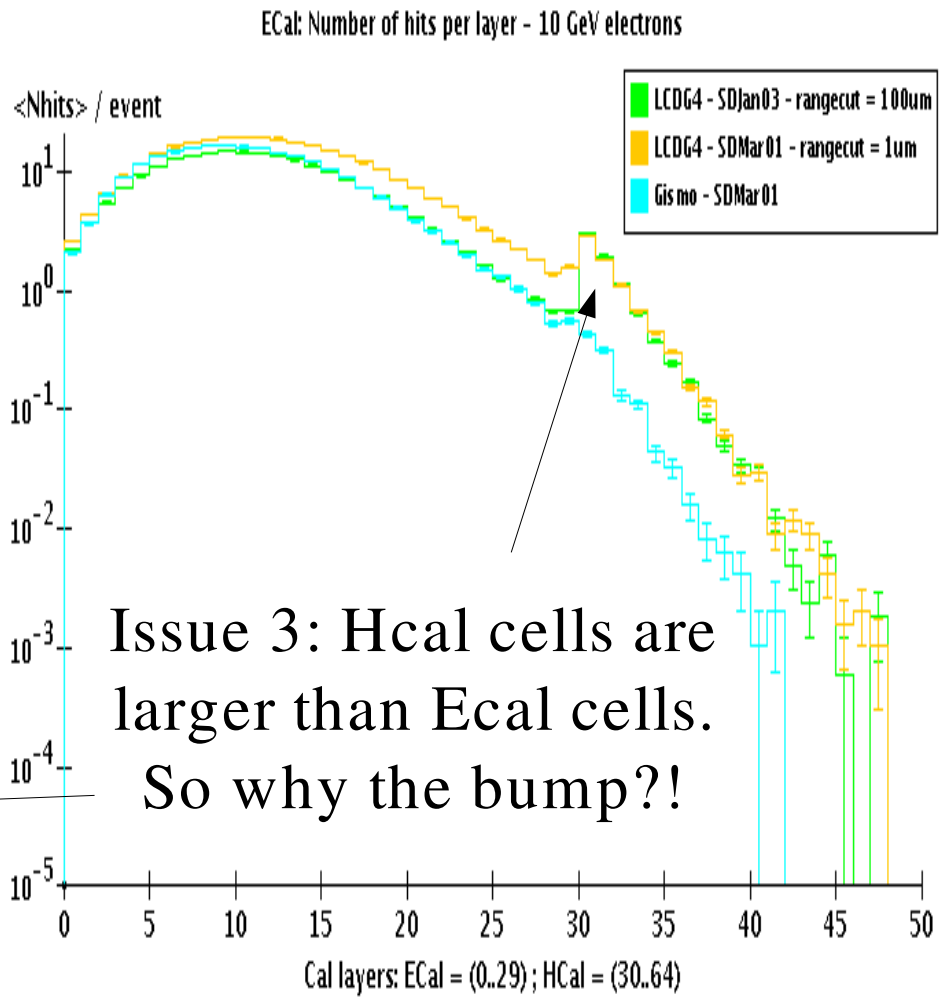


Obviously this is not independent issue, but strongly related to issue 1

Issues 2 and 3: Nhits per layer

Issue 2: LCDG4+SDJan03 is now closer to Gismo+SDMar01 than LCDG4+SDMar01





Issue 3: Hcal cells are larger than Ecal cells. So why the bump?!

Next steps

- Update momenta for preassigned decay products
- Checks for memory leaks and optimization
- Brief investigation on the ECal/HCal interface
- Release
- Documentation and data production (Argonne)
- Visualization improvement (virtual cells)
- Merge projective and non-projective versions
- Different range cuts per subcomponent (ECal)
- LCIO output
- More realistic geometries (medium term)