

Geant4 and low E bump

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New Geant4 version : geant4.9.0.p01
Lots of changes in EM processes (see release notes)
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Mokka 06-04-p03

Bug in Mokka, thanks to Paul!

- Hardcoded parameter in Ecal02:

```
theMaxStepAllowed= std::min(cell_dim_x,cell_dim_z);
```

```
G4UserLimits* pULimits = new G4UserLimits(theMaxStepAllowed);
```

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- Printout with /tracking/verbose 1: parameter rangeCut not taken into account, and this pULimits is clearly overwriting it!

- Printout: with parameters /Mokka/init/rangeCut 0.008 mm,
/Mokka/init/globalModelParameter Ecal_cells_size 0.006

| Step# | X(mm) | Y(mm) | Z(mm) | KinE(MeV) | dE(MeV) | StepLeng | TrackLeng | NextVolume | ProcName |
|-------|----------|----------|-----------|-----------|----------|----------|-----------|---------------------|----------------|
| 0 | 0 | 1.58e+03 | 0 | 1e+05 | 0 | 0 | 0 | WorldPhysical | initStep |
| 1 | 1.22e-15 | 1.6e+03 | 1.22e-15 | 1e+05 | 0.00802 | 20 | 20 | BarrelEcalModule | Transportation |
| 2 | 1.31e-07 | 1.6e+03 | 2.12e-07 | 1e+05 | 0.0538 | 0.2 | 20.2 | BarrelW | Transportation |
| 3 | 5.84e-06 | 1.6e+03 | -8.47e-07 | 1e+05 | 0.461 | 0.219 | 20.4 | BarrelW | muloni |
| 8 | 1.19e-05 | 1.6e+03 | -1.53e-06 | 1e+05 | 1.06 | 0.498 | 22.3 | BarrelEcalModule | Transportation |
| 9 | 1.67e-05 | 1.6e+03 | 1.12e-06 | 1e+05 | 0.0994 | 0.4 | 22.7 | UnderPCB | Transportation |
| 10 | 3.09e-05 | 1.6e+03 | 8.84e-06 | 1e+05 | 0.191 | 0.8 | 23.5 | SiInsensitiveBarrel | Transportation |
| 11 | 3.1e-05 | 1.6e+03 | 8.88e-06 | 1e+05 | 0.0012 | 0.006 | 23.5 | SiInsensitiveBarrel | StepLimiter |
| 90 | 4.15e-05 | 1.6e+03 | 8.83e-06 | 1e+05 | 0.000619 | 0.006 | 24 | SiInsensitiveBarrel | StepLimiter |
| 91 | 4.16e-05 | 1.6e+03 | 8.83e-06 | 1e+05 | 0.00106 | 0.005 | 24 | SiBarrel | Transportation |
| 92 | 4.17e-05 | 1.6e+03 | 8.84e-06 | 1e+05 | 0.00111 | 0.006 | 24 | SiBarrel | StepLimiter |
| 93 | 4.19e-05 | 1.6e+03 | 8.83e-06 | 1e+05 | 0.00238 | 0.006 | 24 | SiBarrel | StepLimiter |
| 94 | 4.19e-05 | 1.6e+03 | 8.83e-06 | 1e+05 | 9.3e-05 | 0.003 | 24 | UpperPCB | Transportation |
| 95 | 6.05e-05 | 1.6e+03 | 8.65e-06 | 1e+05 | 0.213 | 0.8 | 24.8 | BarrelEcalModule | Transportation |

Patch

- In Ecal02, just adding

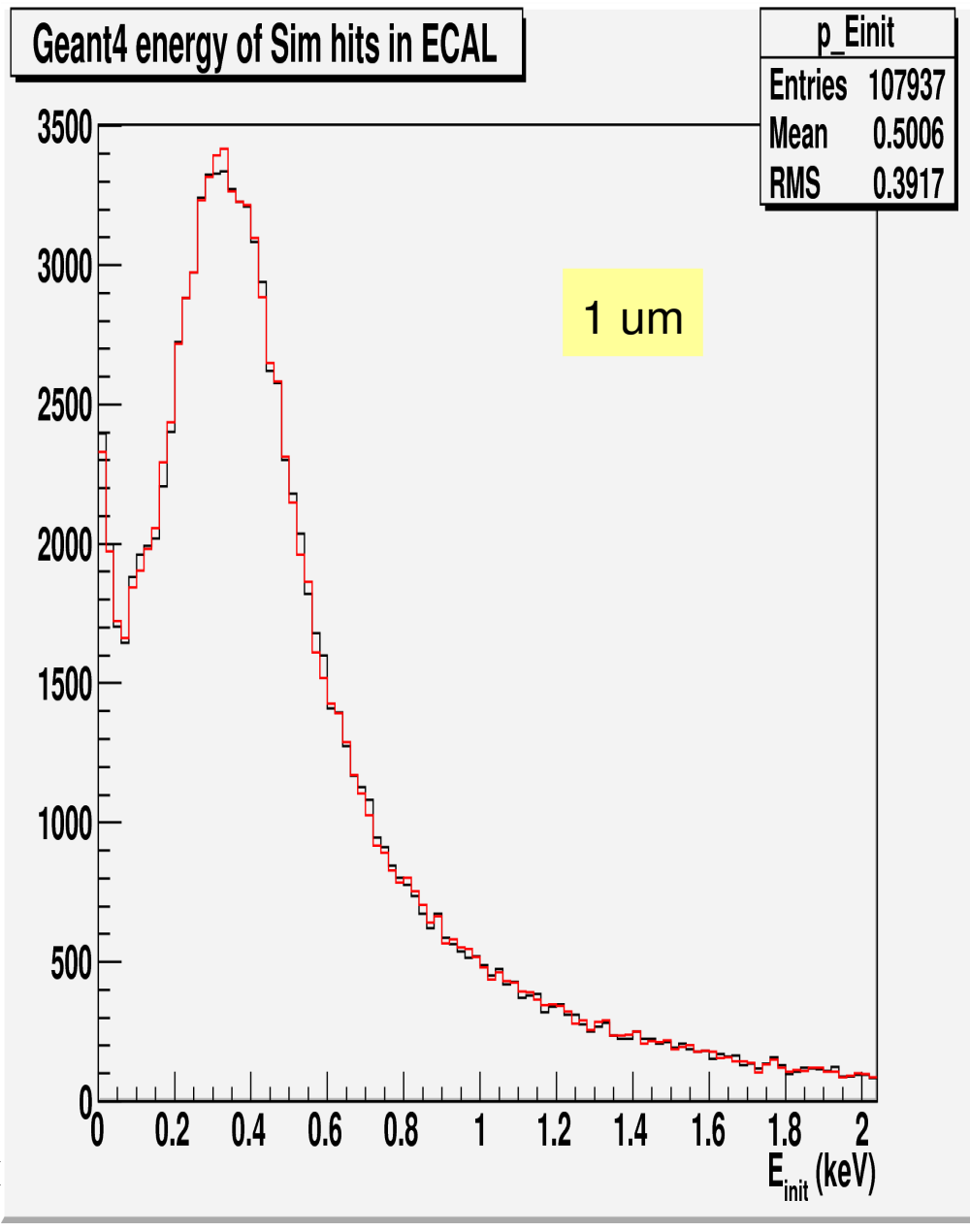
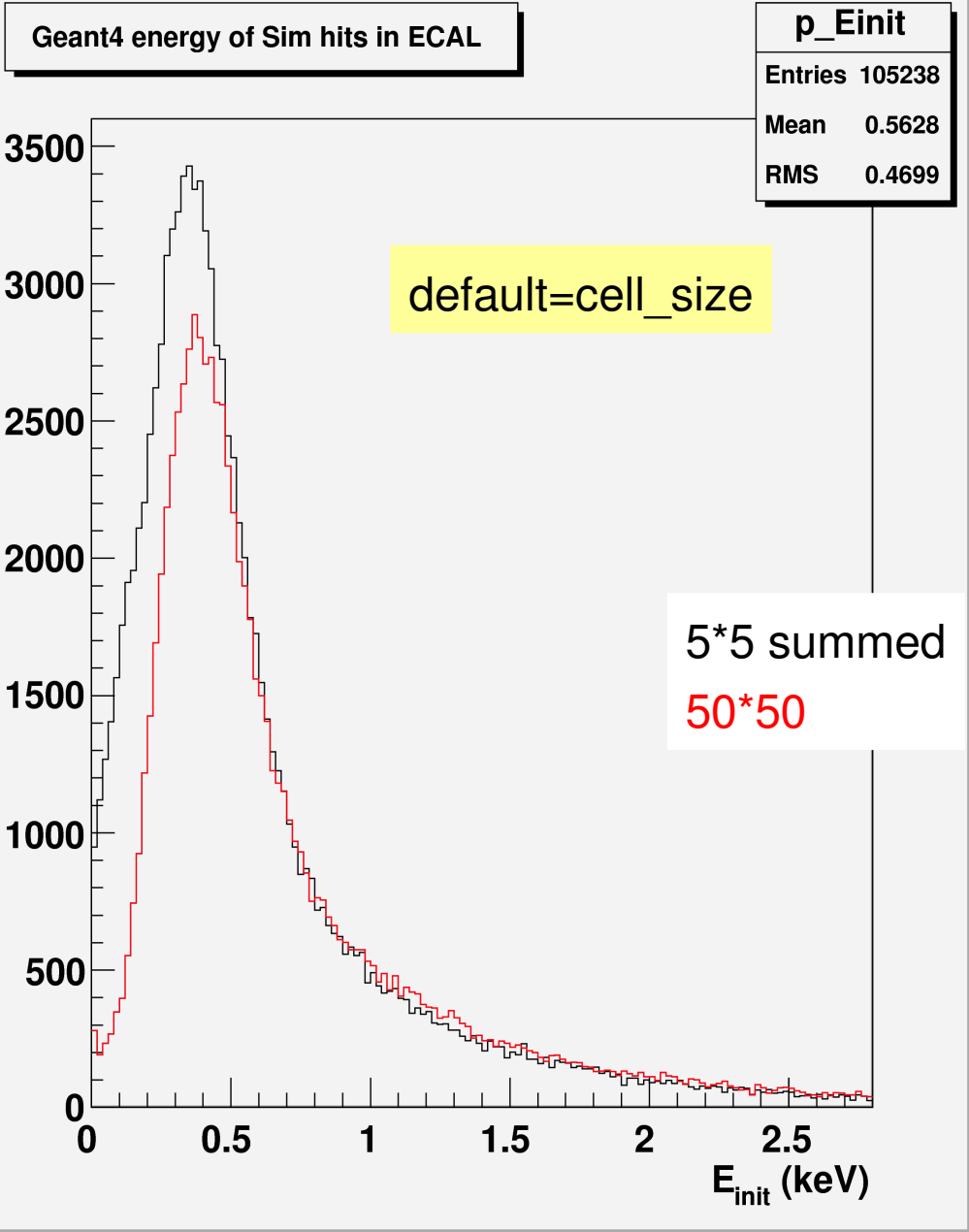
```
theMaxStepAllowed= std::min(cell_dim_x,cell_dim_z);
```

```
theMaxStepAllowed= std::min(theMaxStepAllowed,Control::ActiveRangeCut);
```

- Printout: with /Mokka/init/activeRangeCut 0.001

```
520 -0.00508 1.61e+03 -0.00871 2.14e+03 1.49e-05 0.001 2.78 SiInsensitiveBarrel StepLimiter
521 -0.00509 1.61e+03 -0.00871 2.14e+03 1.02e-05 0.001 2.78 SiInsensitiveBarrel StepLimiter
522 -0.00509 1.61e+03 -0.00872 2.14e+03 0.00322 0.000705 2.78 SiBarrel Transportation
523 -0.00509 1.61e+03 -0.00872 2.14e+03 0.000175 0.001 2.78 SiBarrel StepLimiter
524 -0.00509 1.61e+03 -0.00872 2.14e+03 0.000419 0.001 2.78 SiBarrel StepLimiter
525 -0.00509 1.61e+03 -0.00873 2.14e+03 0.000271 0.001 2.78 SiBarrel StepLimiter
```

Result on the energy distribution, 10 GeV photons, 100 events



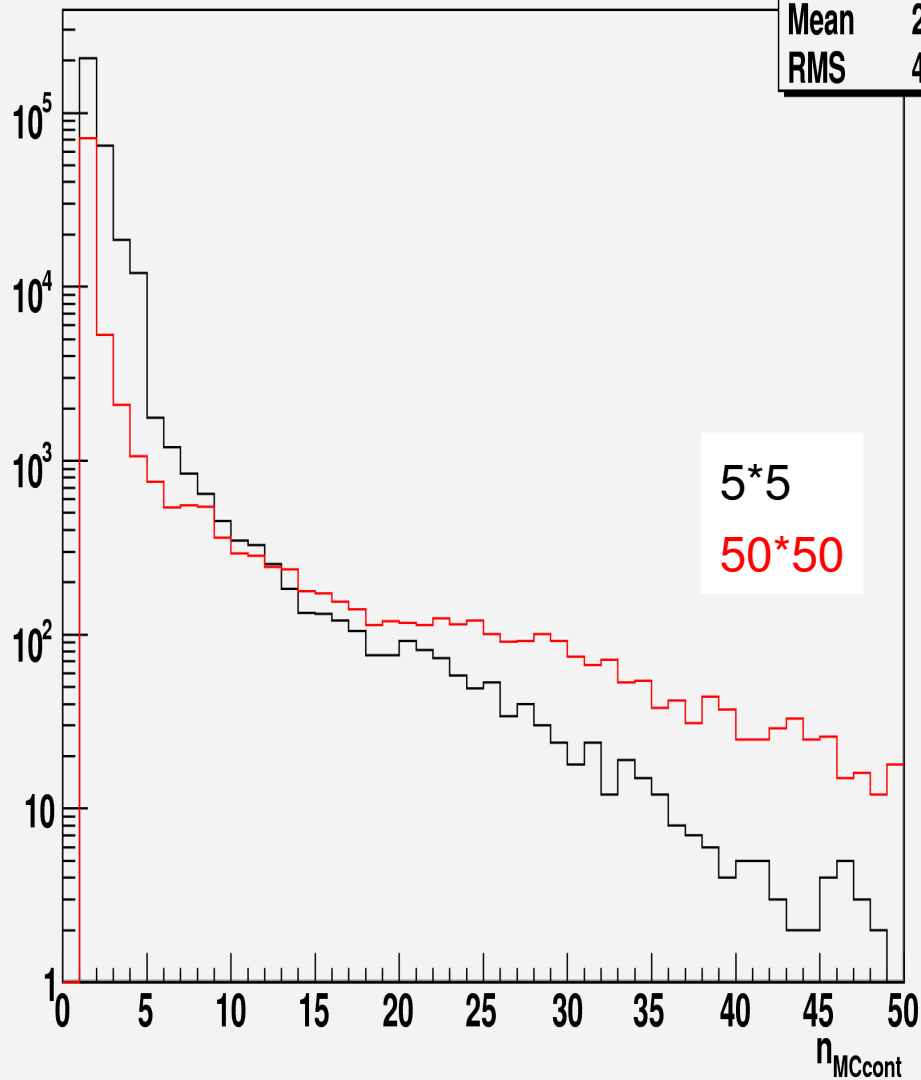
nMCcontributions

Detailed shower mode

Number of MC particle contributing per ECAL hit

p_numMCContributions

Entries 86349
Mean 2.206
RMS 4.655



Number of MC particle contributing per ECAL hit

p_numMCContributions

Entries 355558
Mean 4.448
RMS 3.342

