

FCAL Smearing

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The Deal

- Desirable to have all random numbers applied to Monte Carlo events ***once*** before reconstruction
- Keeping random numbers out of the reconstruction helps ensure that reconstruction of the same event is reproducible
- Charged particle tracking implemented this in the *mcsmeas* program, but calorimetry used a different model that needed to be modified in order to bring it in line with the new philosophy
- The *mcsmeas* program is now updated to include smearing for the FCAL, but the BCAL is yet to be updated
- In addition to *mcsmeas*, parts of the reconstruction and the HDDM data model had to be updated
- This is their story ...

svn log

r5342 | davidl | 2009-07-09 11:46:12 -0400 (Thu, 09 Jul 2009) | 5 lines

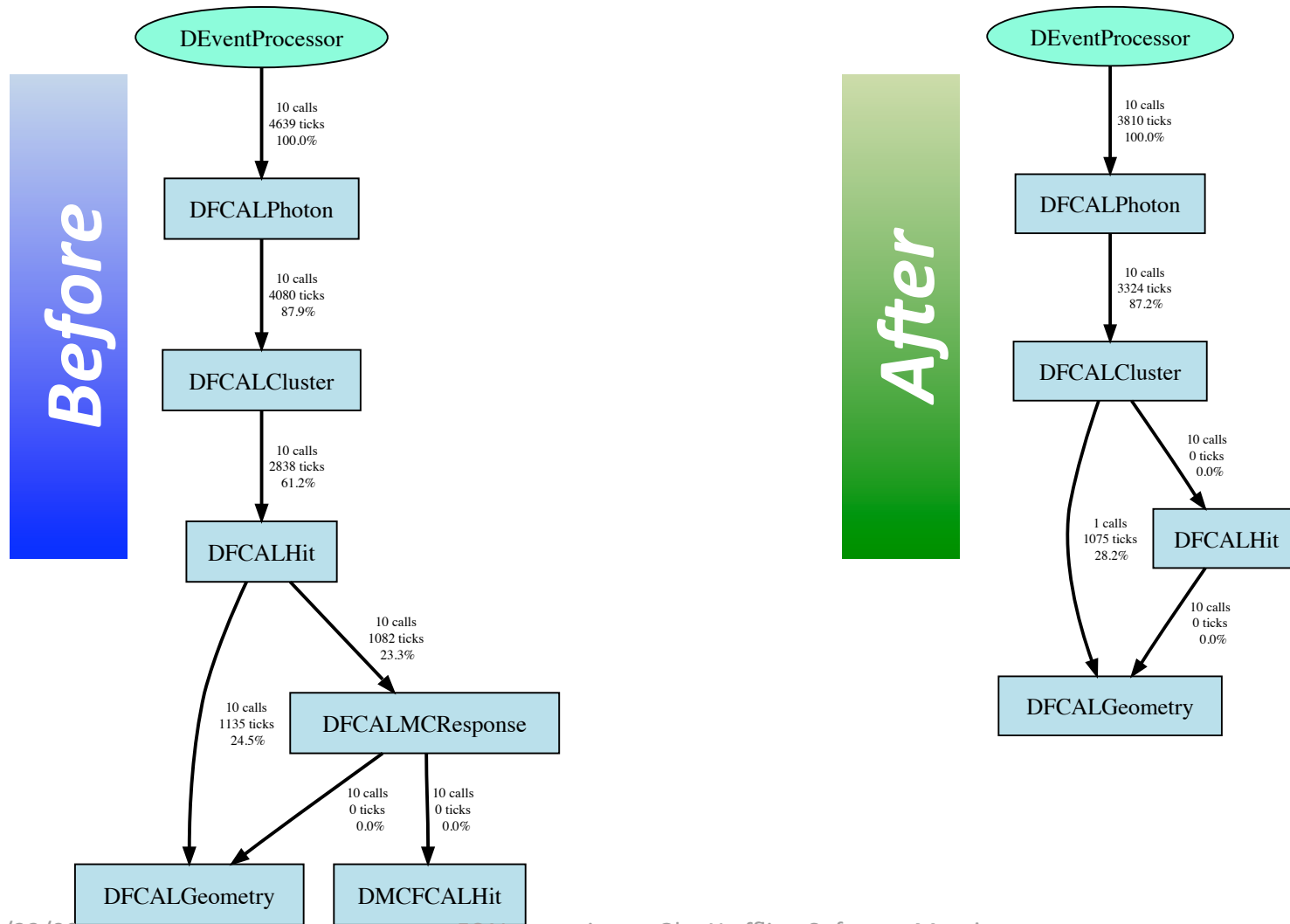
Changed paths:

- M /trunk/src/libraries/FCAL/DFCALCluster_factory.cc
- M /trunk/src/libraries/FCAL/DFCALCluster_factory.h
- M /trunk/src/libraries/FCAL/DFCALHit.h
- D /trunk/src/libraries/FCAL/DFCALHit_factory.cc
- D /trunk/src/libraries/FCAL/DFCALHit_factory.h
- D /trunk/src/libraries/FCAL/DFCALMCResponse.h
- D /trunk/src/libraries/FCAL/DFCALMCResponse_factory.cc
- D /trunk/src/libraries/FCAL/DFCALMCResponse_factory.h
- D /trunk/src/libraries/FCAL/DMCFCALHit.h
- M /trunk/src/libraries/FCAL/FCAL_init.cc
- M /trunk/src/libraries/HDDM/DEventSourceHDDM.cc
- M /trunk/src/libraries/HDDM/DEventSourceHDDM.h
- M /trunk/src/libraries/HDDM/event.xml
- M /trunk/src/programs/Analysis/plugins/fcal_hists/DEventProcessor_fcal_hists.cc
- M /trunk/src/programs/Analysis/plugins/fcal_hists/DEventProcessor_fcal_hists.h
- M /trunk/src/programs/Simulation/mcsmear/Makefile
- M /trunk/src/programs/Simulation/mcsmear/mcsmear.cc
- M /trunk/src/programs/Simulation/mcsmear/smear.cc

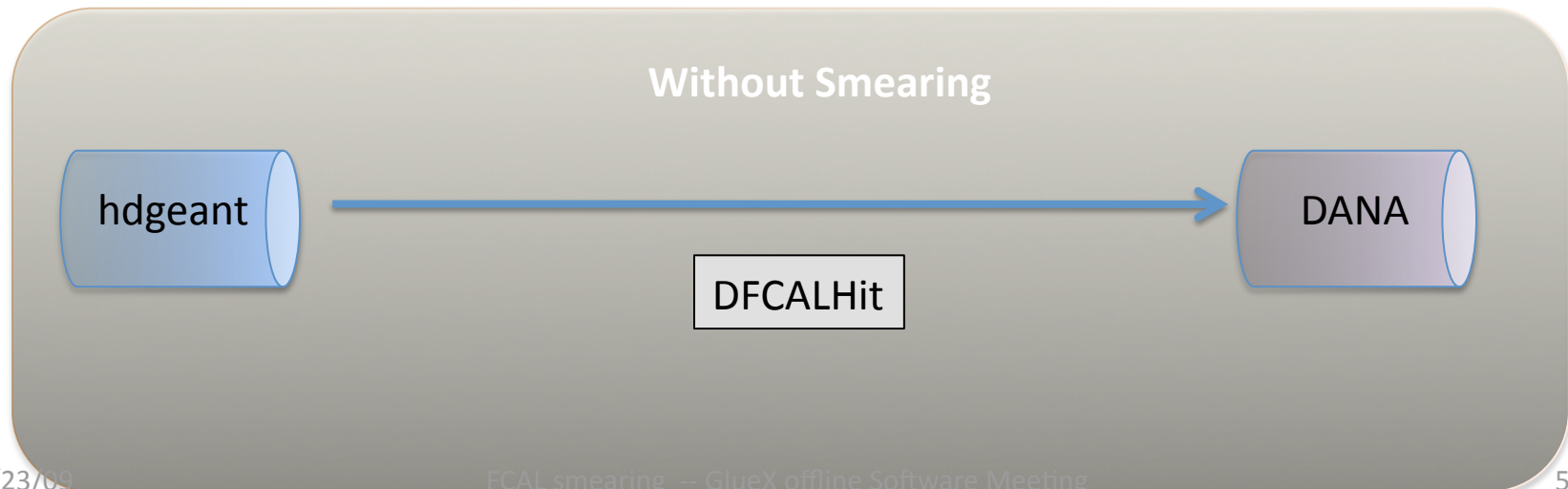
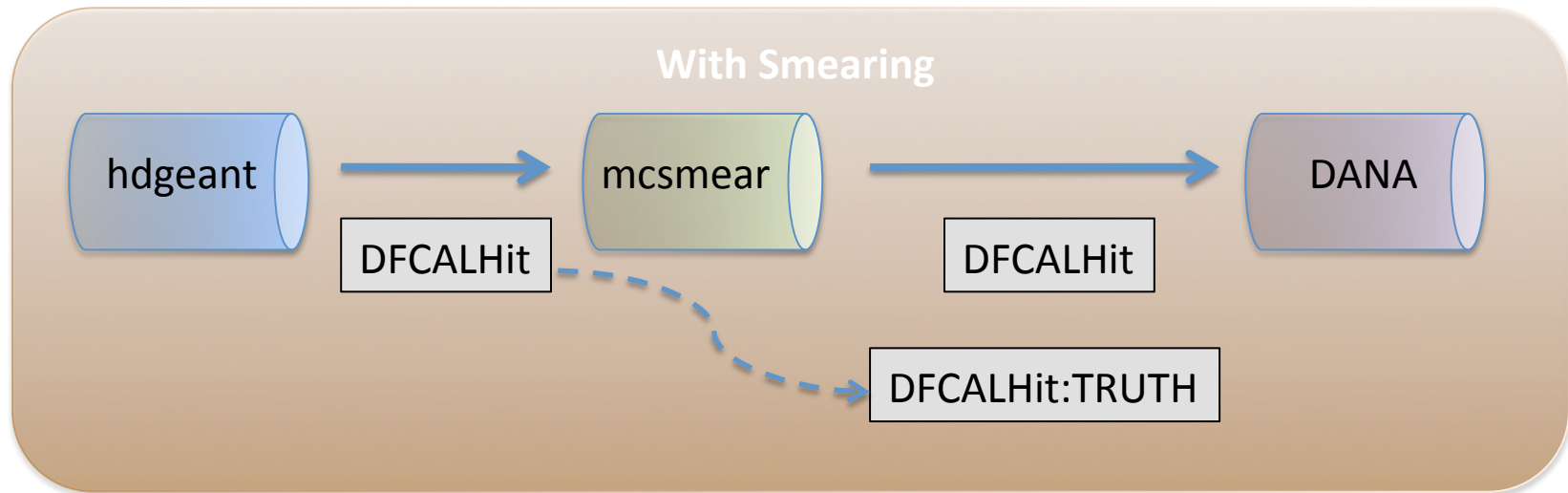
Move the functionality of the DFCALMCResponse factory into the mcsmear program.

This includes several changes to the FCAL package. Nothing really regarding actual reconstruction, but rather in the data flow. The DMCFCALHit, DFCALMCResponse_factory, and DFCALHit_factory classes have all been removed. Now the DFCALHit class contains the MC hit info in a format that the real data will be supplied in (after calibration). The DFCALHit::TRUTH objects contain the unsmeared values iff the un-tagged DFCALHit objects have been smeared by mcsmear.

Factory flow charts



Information Flow



Change to HDDM data model

A change was needed in the HDDM data model to allow both the smeared and unsmeared data to be carried into the reconstruction program.

Existing data structures for charged tracking have proven sufficient for reconstruction code development so far so changes are not needed there.

```
3739 jonesrt <forwardEMcal minOccurs="0">
3739 jonesrt   <fcalBlock column="int" maxOccurs="unbounded" minOccurs="0" row="int">
3739 jonesrt     <fcalHit E="float" maxOccurs="unbounded" t="float"/>
5342 davidl     <fcalTruthHit E="float" maxOccurs="unbounded" t="float"/>
3739 jonesrt   </fcalBlock>
3739 jonesrt   <fcalTruthShower E="float" maxOccurs="unbounded"
              minOccurs="0" primary="boolean" ptype="int" px="float"
              py="float" pz="float" t="float" track="int" x="float"
              y="float" z="float"
              />
3739 jonesrt </forwardEMcal>
```

Summary

- Smearing of FCAL blocks response is now done using *mcsmeas*
- Running reconstruction on data that has *not* been run through *mcsmeas* will still work, but will lead to unrealistically good results (is this an issue?)
- Similar changes still need to be made for BCAL