Software Support for the Beam Test

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First Things First

A fairly detailed run plan is due in a very short time ("end of next week" is being bandied about!).

To support this, we want to have a reasonably realistic simulation in place.

We need to:

• Provide a CU (Calibration Unit) geometry
• Interface beam and Gleam
• Deal with multiple input particles per event
Simulations are needed soon to
- determine the required statistics
- optimize the setup
- investigate the effect of contamination, “pile-up” (multi-particle events)...

Ultimately, they will provide the reference the data have to be compared to.

(my personal) current view: 2-step process
4-Tower CU
In CU coordinate system, incoming particles along z axis

plane for reporting initial particles (in beamline coordinates)

DOF of XY table

x = x₀
Incoming particles at an angle in the x-z plane
Benoit's Beam MC

Possible setup for the CERN Bremsstrahlung beam

Current MC produces a text file of particle parameters… not very convenient for Gleam
what about the XY table?

Thanks Anders!
Then, Subdivide and Conquer

Tasks:
A. Modify Benoit’s program to produce a McParticleCol instead of a text list
B. Enhance Gleam input functionality to:
   – read in more than one particle per event
   – rotate and translate event corresponding to positioning of CU
C. Enhance G4Generator to process multiple particles
Modify Standalone MC

Heather has taken on this job.

• She has Benoit’s code partially running on the norics.
• The program uses G4 libs that are not needed for GR or EM, so some infrastructure work needs to be done, in particular, a new extlib for the extra libs, to keep them away from GR!
• When this is done, she will CMT-ize the code and put it in cvs.
• Finally, the code will be modified to produce mc.root files. (This is the easy part!)
Possible format of the root file

Each event contains an McParticleCol containing an initial “particle” and one or more daughters.

• The daughters are the actual particles produced by the beam
• The initial particle is a fake, whose 4-momentum is the sum of the 4-momenta of the daughters, and whose position is on the beam line at the reporting plane.

I’ve made a little toy root file which may be useful to test the Gleam changes… probably need to iterate.
Enhance Gleam

Input: **Toby** has started working on this. The job appears to be straightforward.

- A new algorithm will:
  - accept the name of a file containing the particles
  - read them in for each event
  - apply rotations and translations as specified in the jobOptions file.

**G4Generator: Tracy** is doing this part. He’s nearly ready to try out his changes on a real input file.
Extras
3-Tower CU