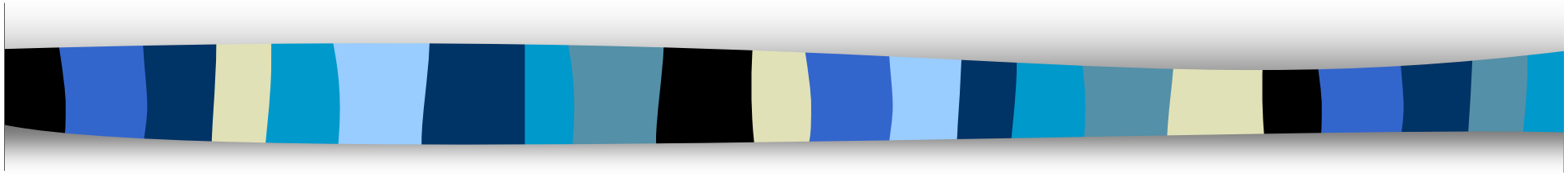
Geant4 Simulations: First Report



- Main goals of the simulations
- The Paris package
- What is to be done ? Who ?

Main goals of the simulations

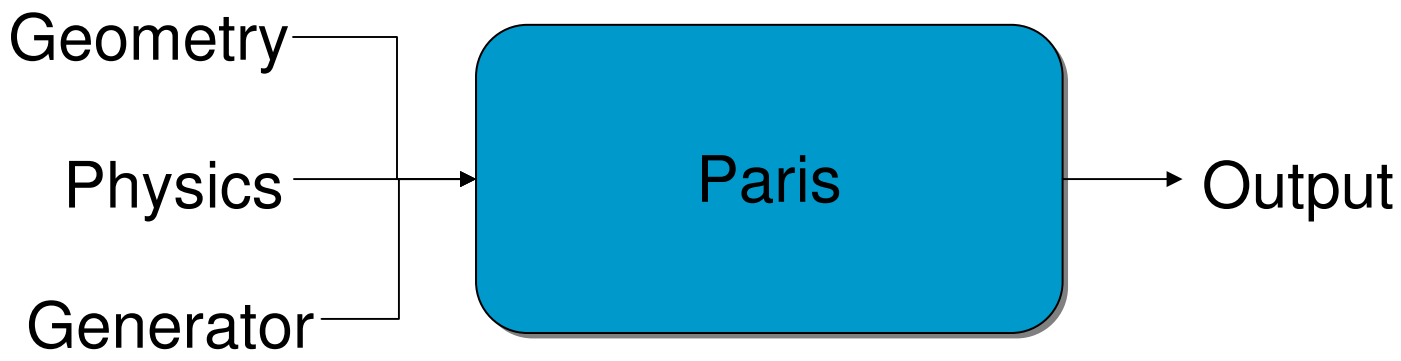
From the Paris web pages (Aim of collaboration):

• Develop and construct a completely new calorimeter, **which can measure both high energy and low energy gammas**. This can be done either simultaneously (using signal pulse processing), or **by selecting one range or another (inserting/removing absorbers in front and changing the dynamical range).**

• **Develop a 2-shell calorimeter,** with inner (hemi-)sphere, highly granular, made of new short crystals (LaBr3(Ce), LaCl3, CeZnTe). The readout might be performed with APDs or with digital electronics which would offer the possibility of pulse shape analysis. **The outer (hemi-)sphere, with lower granularity but with high volume detectors**, could be made from conventional crystals (preferably of BaF2), or using existing detectors (Chateau de Crystal or HECTOR). **The inner-sphere will be used as a multiplicity filter, sum-energy detector** and will also serve as an absorber for the large detectors behind. The outer-sphere will measure high-energy photons.

• Use **existing high-energy gamma detectors** (e.g. Chateau de Crystal or HECTOR) and fill the remaining solid angle **with a new calorimeter**.

The Geant4 Paris Package



➔ **Modular so that it is easy to change one module !**

Release1.0 available on the Paris web site (download section)

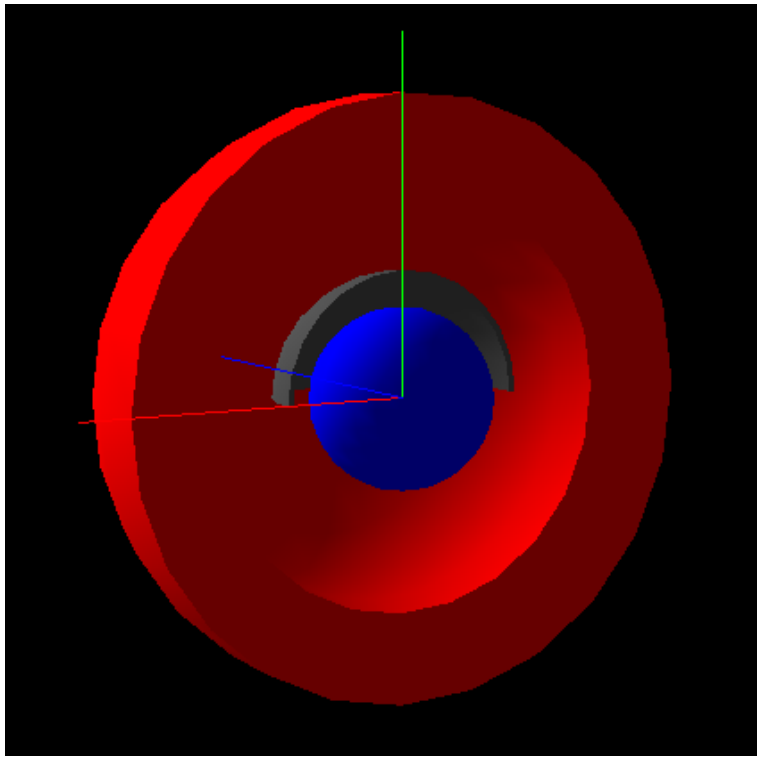
Existing documentation - User's guide

Discussions (google group)

Paris: existing geometries

A single ascii file to build a set of concentric shells:

- 1 or 2 active (detectors)
- Non active (absorbers)
- Part of shells
- Main materials defined
  LaBr3, BGO, CsI …

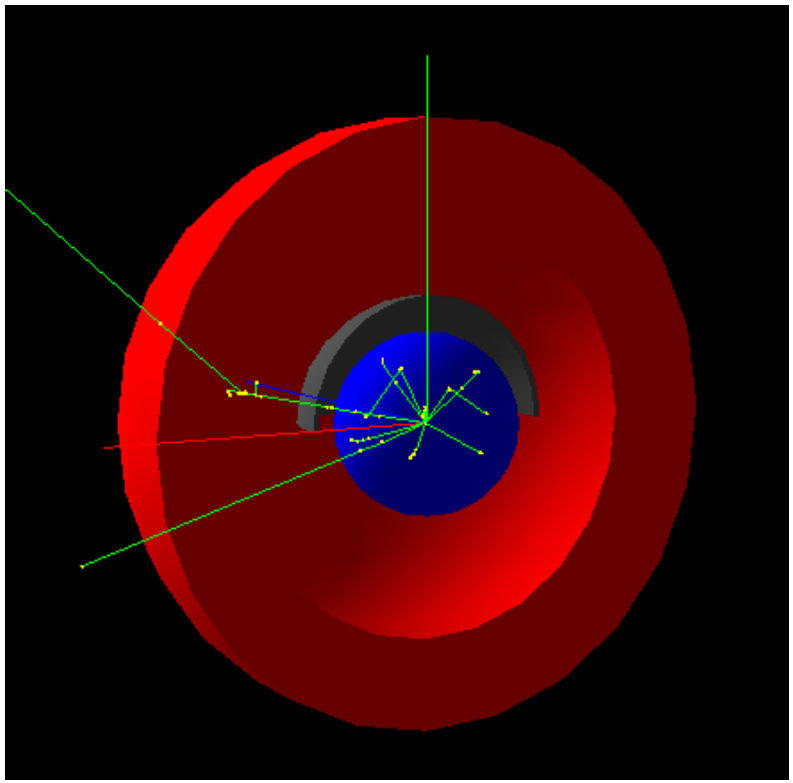


Paris: physics, γ-rays generators

Two types of generators available:

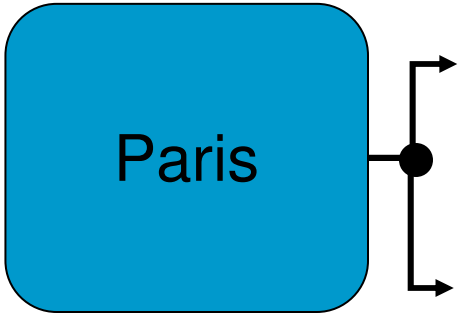
- Cascade of:
  - discrete γ-rays
  - from uniform distribution
- In a given direction (cone)
- With a recoil velocity

- Standard Electomagnetic processes



➔**An event is a collection of hits (e,x,y,z ….)**

Paris: outputs and analysis

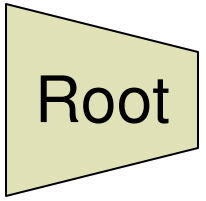


lyopc457

Fichier Édition Affichage Terminal Onglets Aide

```
--------------- ParisSingleHit::Print() --------------------
trackID: 3, parentID: 0, primaryID: 3, particleName: gamma, processName: phot
detID: 1, detName: Inner, motherID: 0, motherDetName:
edep: 38.925 keV, pos: (-94.1227,14.271874,-32.819021), ToF: 0.73346487 ns
------------------------------------------------------------
```

Output2
(ascii file)



Histograms

lyopc457

Fichier Édition Affichage Terminal Onglets Aide

```
$ 8
P      1    1 2630.66 -0.45 -0.74 -2.48
H      1    1   38.92 10.30 5.00 6.46
H      1    1  204.90 10.30 5.01 6.46
H      1    1  213.74 -1.73 -2.87 -9.65
H      1    1  300.17 -1.73 -2.89 -9.69
H      1    1  492.16 -1.76 -2.90 -9.73
H      1    1   91.70 -1.77 -2.90 -9.73
H      1    1  696.92 -1.78 -2.94 -9.71
H      1    1  251.49 -1.79 -2.94 -9.70
H      1    1   38.92 -1.77 -2.91 -9.64
H      1    1   48.71 -1.77 -2.91 -9.64
H      1    1  253.01 -1.77 -2.90 -9.73
$ 9
P      1    1 17404.36 -3.95 -3.94 16.49
H      1    2  899.43 -7.81 -7.82 33.06
```

- - - - → Your analysis framework ..

➔**First studies: Christelle's talk**

Organisation of the work ?