

# Parallel Session 3B


## Basic and extended examples

Co-chairs:

- I. Hrivnacova, IPN Orsay (CNRS/IN2P3)
- P. Gumplinger, TRIUMF

20<sup>th</sup> Geant4 Collaboration Meeting,  
2 October 2015, Fermilab

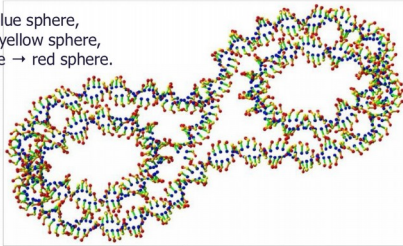
# Agenda

<b>medical/dna examples</b>	<i>Dr. SEBASTIEN INCERTI et al.</i>	
<i>WH8XO - Hornet Nest</i>		11:00 - 11:25
<b>exoticphysics/ucn example</b>	<i>Dr. Peter GUMPLINGER</i>	
<i>WH8XO - Hornet Nest</i>		11:25 - 11:35
<b>parameterisation/Par02</b>	<i>Dr. Alberto RIBON</i>	
<i>WH8XO - Hornet Nest</i>		11:35 - 11:45
<b>biasing/GB04</b>	<i>Marc VERDERI</i>	
<i>WH8XO - Hornet Nest</i>		11:45 - 11:50
<b>eventgenerator/basicPrimary</b>	<i>Michel MAIRE</i>	
<i>WH8XO - Hornet Nest</i>		11:50 - 11:55
<b>parallel/MPI/ex03</b>	<i>Dr. Andrea DOTTI</i>	
<i>WH8XO - Hornet Nest</i>		11:55 - 12:05
<b>Work plan items &amp; discussion</b>	<i>Ivana HRIVNACOVA</i>	
<i>WH8XO - Hornet Nest</i>		12:05 - 12:35

# New Examples

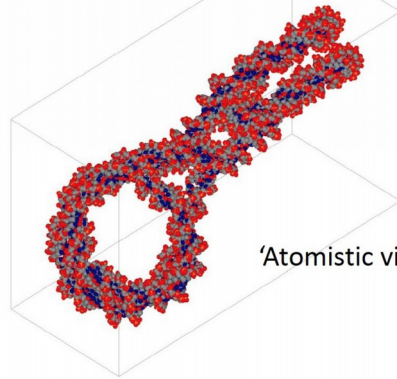
# 3 visualizations

- Base → blue sphere,
- Sugar → yellow sphere,
- Phosphate → red sphere.

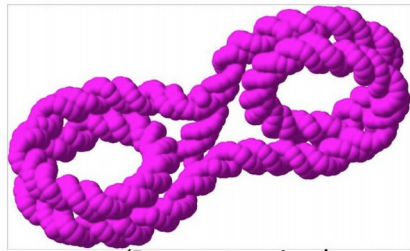


'Residue view'

- CPK coloring
- Hydrogen(H) → white sphere,
  - Carbon(C) → gray sphere,
  - Oxygen(O) → red sphere,
  - Nitrogen(N) → dark blue sphere,
  - Sulfur(S) → yellow sphere,
  - Phosphorus(P) → orange sphere,
  - others/undefined → pink sphere



'Atomistic view'



'Barycenter view'

## Geant4-DNA extended examples Mathieu Karamitros Sébastien Incerti medical/dna

- Demonstrate using the Geant4-DNA physics processes and models.
- 10 examples presented one by one

## Ultra Cold Neutron (UCN) example

**Peter Gumplinger**  
Geant4 collaboration meeting  
Chicago, Sept. 29, 2015

## UCN example Peter Gumplinger exoticphysics

- Simulates the passage of ultra-cold neutrons (UCN) in a hollow pipe

# Fast Simulation Models

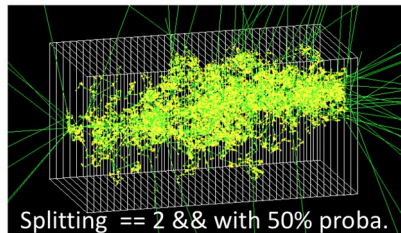
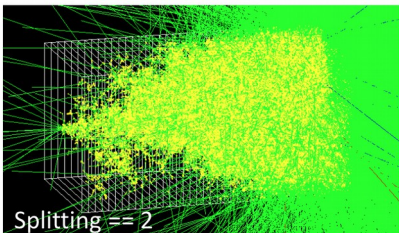
3 models, each bound to a sub-detector

- **Tracker**
  - When a charged particle enters the tracker, it is placed to the end of the tracker (where it would exit if transported normally) but with a (gaussian) smeared momentum
- **Electromagnetic Calorimeter (ECAL)**
  - When a primary electron, positron or gamma enters the ECAL, it is killed and its (gaussian) smeared energy is deposited
- **Hadronic Calorimeter (HCAL)**
  - When a primary hadron enters the HCAL, it is killed and its (gaussian) smeared energy is deposited

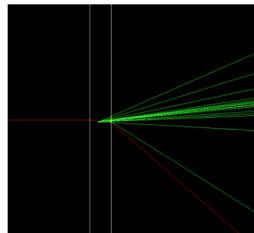
No fast simulation model is used in the muon subdetector<sub>4</sub>

## GB03 & GB04

- GB03 and G04 introduced in November 2014, for 10.1.
- Re-implement existing options, to verify generic classes provide intended functionality.
- GB03:
  - Illustrates a geometry-based biasing (with importance associated to volumes).
  - Includes "(re?)invented" option to simply tackle over-splitting.



- GB04:
  - An example re-implementing Bremsstrahlung splitting
    - It is an example of final state biasing.
  - Comes with specific commands:
    - /GB04/biasing/setSplittingFactor [N splitting]
    - /GB04/biasing/biasPrimaryOnly [true/false]
    - /GB04/biasing/biasOnlyOnce [true/false]



## Par02 extended examples

Alberto Ribon

parameterisation

- Demonstrates how to do "track and energy smearing" in Geant4, in order to have a very fast simulation based on assumed detector resolutions
- Based on an application developed by the Ph.D. student Anna Zaborowska

## Generic Biasing Examples Status

Marc Verderi

biasing

- Update on existing (01,02) examples
- New GB03,04 examples: geometry-based biasing, Bremsstrahlung splitting
- Discussion about how to improve B01 and GB03 which implement the same scenario<sup>5</sup>

# basicPrimary

This example illustrates the basic functionalities to generate a primary event :

```
G4PrimaryVertex(..) G4PrimaryParticle(..)
```

It shows how to create several vertices and several tracks per vertex.

*(It should have been there since the beginning ...)*

*Better to run interactively, with visualization*

G4 Collaboration Meeting – September 2015

Michel Maire

## Goal of examples:

SLAC

Showing how integrate MPI with Geant4

- control application passing UI commands via MPI
- show merging of user-data via MPI, histograms, command-line scorers, G4Run derived class **NEW**

Examples come with a new G4 library (libG4mpi)

- cmake config file created: G4mpiConfig.cmake
- allows user to use `cmake -DG4mpi_DIR=...`

Three examples available

- exMPI01 : basic example showing G4mpi functionalities
- exMPI02 : example showing use of ROOT, more realistic medical type example
- exMPI03 : same geometry of 02, using g4analysis and showing merging of results **NEW**

# basicPrimary example

Michel Maire

eventgenerator

- Show how to create primary particles and vertices using G4PrimaryVertex and G4PrimaryParticle classes
- **Recommendation: add the code from PrimaryGenerationAction in a new class extending G4VGenerator to be consistent with Geant4 framework**
- This will make the PrimaryGenerationAction code in this example symmetric to particleGun and GPS examples

## MPI Examples

Koichi Murakami, Andrea Dotti

Parallel/MPI

- New exMPI03 : same geometry of 02, using g4analysis and showing merging of results

# Work Plan & Discussion

# Discussed Items

- Update main() functions in extended examples which are instantiating G4UIExecutive according to basic examples, which were improved in 10.1 release
  - Remove G4VIS\_USE and G4UI\_USE macros and instantiate G4UIExecutive at the same beginning of main()
- C++11 in examples
  - Proposal to introduce C++11 features in one basic example
  - Use of G4Atomic in B1 example (J. Madsen)