## Geometry Summary of Parallel Session 5-B



Gabriele Cosmo – CERN PH/SFT

# Parallel Session 5-B



থ "Unified Solids"

ন্থ by Marek Gayer (CERN/EU-AIDA)

- CAD to GDML Converter"
  CAD to GDML Converter"
  CAD By Emmanuel Delage (*LPC/IN2P3*)
- Surface-normal on global coordinates issue"
   By John Apostolakis (CERN)
- "Thread-safety for sharable data in geometry classes"
   By John Apostolakis (CERN)

## Unified Solids

by Marek Gayer

C + X Name

0.7180

0.0598

-0.5555

0.8211

0.0017

-0.5969

0.2033

-0.6160

0.0611

0.0861

0.2039

0.6049

\* D # X

Stack: Base

Value

Cold and the

FLD Splact data to olot

Inspection of values and differences of scalar and vector data sets

No valid plots for: NormalU... .

NormalGeant4 <10000x3 doubles

3.995

0.4470

-6.0066

-0.6740

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-0.4545

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-0.9796

0.7941

...

0.7180

0.0598

0.8211

0.0017

0.5060

-0.2033

-0.6160

0.0611

0.0861

0.6049

Nermal/Solub

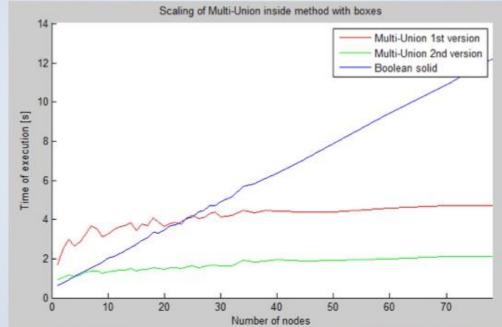
Different point found, index 988 difference is -1

Different point found, index 989 difference is -1

Different point found, index 991 difference is 1 Different point found, index 992 difference is 1 Total number of different points: 190 • Comprehensive testing suite developed to benchmark and check correctness

• Including also new developments: e.g. multi-union solid

## Scaling of Multi-Union vs. Boolean solid



• Complete by Geant4 release X

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0.5636

0.0754

0.8950

0.792

0.4064

0,2883

0.2728

-0.5434

0.2938

0.979

0.7941

They to MATLAB! Watch this Video, see Demos. or read Getting Marted

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Hormat/Solids <10000x3 doubler

-0.0057

0.447

-0.3520

-0.0066

0.7121

-0.674

0.4903

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-0.953

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-0.0035

-0.0594

fx >>

+ C # X T Variable Editor

A MATLAS 7.11.0 (R20106)

# multiunion-5-604

Elle Edit Debug Desktop Window Help

Shortman 20 Minutes Add 21 What's New

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No details available

# Start

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## CAD to GDML Converter

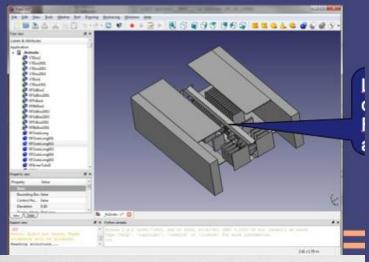
#### by Emmanuel Delage

2

3

#### FreeCAD Development

- Open source CAD software
- Efficient modularity, reactive forum, easy to dev.
- Languages: C++ and Python
- Librairies: OpenCascade, Coin3D, Qt, XercesC...
- Supported platforms: Windows, Linux, Mac OSX



# • Future evolution is not at all clear, though ...

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#### • Open source tool based on FreeCAD under development

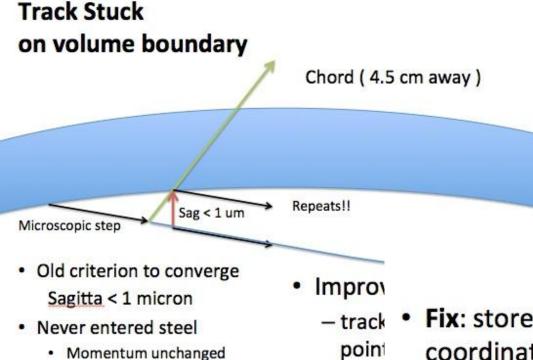
• Promising tool for translating to GDML as original geometrical primitives CAD geometries, keeping alive volume's hierarchy

correctly estimated

#### Possible steps and scheduling

	(months)
Verbosity implementation	0.5
Prevent unrecognized solids	0.5
Boolean solids implementation	1
Write a developer documentation.	1
STEP, STL or PLY to GDML conversion	1
(tessellated solids only).	
Hierarchy and material implementation	6
Full GEANT4 geometry implementation	×
Need further	

### Surface-normal on global coordinates issue by John Apostolakis



• Fix on the way, requiring migration of specific user's code

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- Fix: store the exit normal in Global
   coordinates
  - Right away when the vector and reference frame are in sync.
  - Status: trial of fixes (Peter G.)
    - First trial situation is improved
    - Open: the 'valid' flag is currently set to false.
  - Fix and a tag are under preparation

Modifications included in release
9.5 and 9.4.p03 to resolve longstanding problem with stuck tracks on boundaries flagged by ATLAS
Side effect: wrong computation of normal in coincident surfaces...

## Current status

### Thread-safety for sharable data in geometry classes by John Apostolakis

## Use in Tracking – after relocation

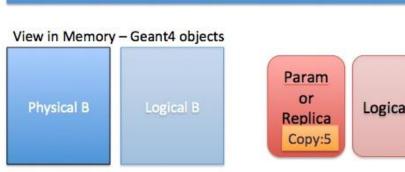


- *Reviewed main cases of RW data in the geometry classes and solution implemented in Geant4-MT*
- Presented ideas to alternatively eliminate RW data from the geometry instances

### **Tentative Plans**

- Goal: Reduce or eliminate RW information in 'live' geometry tree
  - Keep all information about current volume only in G4TouchableHistory
  - Can it be done without breaking interfaces?
  - Challenge: What about existing uses of key methods?
    - in PhysicalVolume->GetLogicalVolume
    - logicaVolume->Get(Solid,Material, ..)

Logical View – Replica or Parameterised Volume



• To be studied for Geant4 release X

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