

Update on requirements

Geant4 Technical Forum
08/11/2011

Marc Verderi
LLR, Ecole polytechnique

For the Geant4 Collaboration

The requirement tracking system

The JIRA-based Requirement Tracking System

- The new requirement tracking system has been launched:
 - It has been built by our KEK colleagues, and is hosted there
 - It is linked from
 - the Collaboration page:
 - <http://geant4.cern.ch/collaboration/>
 - the support page:
 - <http://geant4.cern.ch/support/>
 - or directly at
 - <http://jira-geant4.kek.jp/secure/Dashboard.jspa>
- **The system allows users to follow progresses on agreed requirements**
- Policy for submitting requirements remains the same :
 - Requirements are proposed through the same channels as before:
 - HN, TF, e-mail, discussion, etc.
 - They will be agreed/reshaped/rejected by the SB
 - And entered in the system if/when agreed

Requirement Tracking System Front Page

Introduction

Geant4 Requirements Tracker

Welcome to the Geant4 Requirements Tracking System. With this system, you may follow the progress of development on each individual requirement.

Users may submit requirements on improving the Geant4 toolkit and its associated examples and documents through various communication channels, which include the Geant4 Technical Forum, Geant4 HyperNews, Users workshops and tutorials. The Geant4 collaboration then evaluates the feasibility and required resource for each of these requirements and lists accepted requirements on this tracking system.

Once listed, each requirement has its ID and responsible Geant4 developer(s), and the status of development is regularly updated.

Filter Results: In Progress

T	Key	Summary	P
	UR-9	Displacement in thin volumes	↑
	UR-8	Lateral displacement in large volume	↑
	UR-7	Alternative models for intermediate energies	↑
	UR-4	Cross sections for K-K+	↑
	UR-3	Regularize error messages	↑
	UR-2	UR-1 / Interaction : Physics modeling	↑
	UR-1	Anti-Ion interactions	↑

Displaying issues 1 to 7 of 7 matching issues.

Filter Results: Open

No matching issues found.

Filter Results: Closed

T	Key	Summary	P
	UR-6	Choice of physics processes (or options) per region	↑
	UR-5	Interfaces of Physics Builders	↑

Displaying issues 1 to 2 of 2 matching issues.

Issue Statistics

Statistics: User Requirements (Status)

In Progress	7	100%
-------------	---	------

Total Issues: 7

Issue Statistics

Statistics: User Requirements (Assignee)

Dennis Herbert Wright	4	57%
Makoto Asai	1	14%
Vladimir Ivantchenko	2	29%

Total Issues: 7

Activity Stream

Recent Activity

November 01

- Koichi Murakami** added the Component 'Hadron' to UR-7 - Alternative models for intermediate energies
 November 01 at 10:21 AM
- Koichi Murakami** changed the Assignee to 'Vladimir Ivantchenko' on UR-8 - Lateral displacement in large volume
 November 01 at 10:20 AM
- Koichi Murakami** changed the Assignee to 'Vladimir Ivantchenko' on UR-9 - Displacement in thin volumes
 November 01 at 10:19 AM

Show more...

Example of “UR1” : Anti-ion interactions

Browser tabs: [#UR-1] Anti-ion interaction..., Yahoo! France, LHC detector simulations: s...

Address bar: jira-geant4.kek.jp/browse/UR-1

Navigation: Most Visited, Getting Started, Latest Headlines, Yahoo! France, Boursorama : numéro..., Crédit Mutuel, LA ban..., Google, Laboratoire Leprince..., Geant4: A toolkit for ...

User Requirements / UR-1

Anti-ion interactions

Voters | Watchers | More Actions

Views

Details

Type:	Requirement	Status:	In Progress
Priority:	Major	Resolution:	Unresolved
Affects Version/s:	None	Fix Version/s:	9.4
Component/s:	Hadron		
Labels:	2801		

People

Assignee:	Dennis Herbert Wright
Reporter:	Makoto Asai
Vote (0)	Watch (0)

Dates

Created:	24/Jan/11 6:49 AM
Updated:	28/Oct/11 5:51 PM

Description

Light Antilon Transport with Geant4.

Scope

- Light antiions: antideuteron, antitriton, antiHe3 and antiHe4
- Energy loss, absorption, (quasi)elastic scattering
- Materials: H, C, N, O, Si, Al, ...
- Momentum range 0.1 - 4 GeV

Improved calculation for anti-d, -t, -He

Used approach of

- Generator of inelastic nucleus-nucleus interaction diagrams
 - Computer Physics Communications, V 54, 1989, Pages 125-135, S. Yu. Shmakov, V. V. Uzhinskii, A. M. Zadorozhny

And cross sections from Kossov/CHIPS (2010) and

- Cross Sections of Various Processes in Pbar P-Interactions, V.V. Uzhinsky, A.S. Galoyan
 - <http://arxiv.org/abs/hep-ph/0212369v1>

Cross sections for anti-d, -t, He

- Used
 - Nuclear density of W. Broniowski, M.Rzyczynski, P. Bozek, CPC, 180, (2009), 69
- Result
 - Total, elastic, absorption cross section for any nucleus

Cross section implementation

New requirement(s)

3001 : Nucleus–nucleus collisions, up to 200A GeV/c

- Requestors: Marina Golubeva, Marek Szuba (NA61/SHINE) – 03/2011
- Context:
 - NA61/SHINE : fixed-target experiment at the SPS, studying p+p, p+A and A+A collisions at $p_{\text{beam}} = 10A\text{--}350A \text{ GeV/c}$
 - Measures fragments and spectator nucleons of projectile nuclei in forward detector PSD (Projectile Spectator Detector)
 - First Ion-Beam data expected by November 2011
- Problem:
 - No low energies in the simulated PSD E distribution
 - Cause: no ion–nucleus interactions above 20A GeV/c in Geant4
- Request:
 - Include nucleus–nucleus collisions, at up to 200A GeV/c
- Status November 2011:
 - Hadr02 example demonstrating usage of interface to DPMJET2.5
 - Tools have been provided, G4 team encourages the NA61/SHINE to validate against their data. G4 interested in the physics comparison.
 - **Proposed to be closed.**

Open requirements

2801: Anti-ion interactions

- Requester: ALICE (A. Morsch)
- Responsibles: D. Wright / V. Uzhinskiy
- Scope :
 - Light anti-ions: anti-deuteron, anti-triton, anti-He3 and anti-He4
 - Energy loss, absorption, (quasi)elastic-scattering
 - Materials: H, C, N, O, Si, Al, ...
 - Momentum range 0.1–4 GeV
- From March 2011 TF :
 - \bar{p} cross-section from simplified Glauber approach
 - \bar{d} , \bar{t} and $\overline{\text{He}}$ with full Glauber one
 - Model beta-version introduced in 9.4-ref-02
- Status from today:
 - Delivered with the 9.5 release
 - Expect feed-back on physics performance from ALICE Collaboration.
 - **Open**

2703: Regularize error messages

- Originators: (LHCb, Gloria Corti), & all LHC exp. - March 2010
- Responsible(s): general to G4
- Context:
 - Need to create scripts to extract G4 errors from 50K job files/day.
- Requests
 - A unique way of messaging errors/warnings to enable a generic script to find ALL of them
 - And/or a summary of error messages
- Status from today:
 - New G4Exception scheme will be released in 9.5
 - Example of exception print out:

```
!!!!!! - !!!!!!! - !!!!!!! - !!!!!!! - !!!!!!! - !!!!!!!  
*** G4Exception : Run0004  
        issued by : G4RunManager::InitializePhysics()  
G4VUserPhysicsList is not defined!  
*** Fatal Exception *** core dump ***  
!!!!!! - !!!!!!! - !!!!!!! - !!!!!!! - !!!!!!! - !!!!!!!
```
 - **Propose to close after feed-back from requesters**

2701: Cross-sections for K-/K+

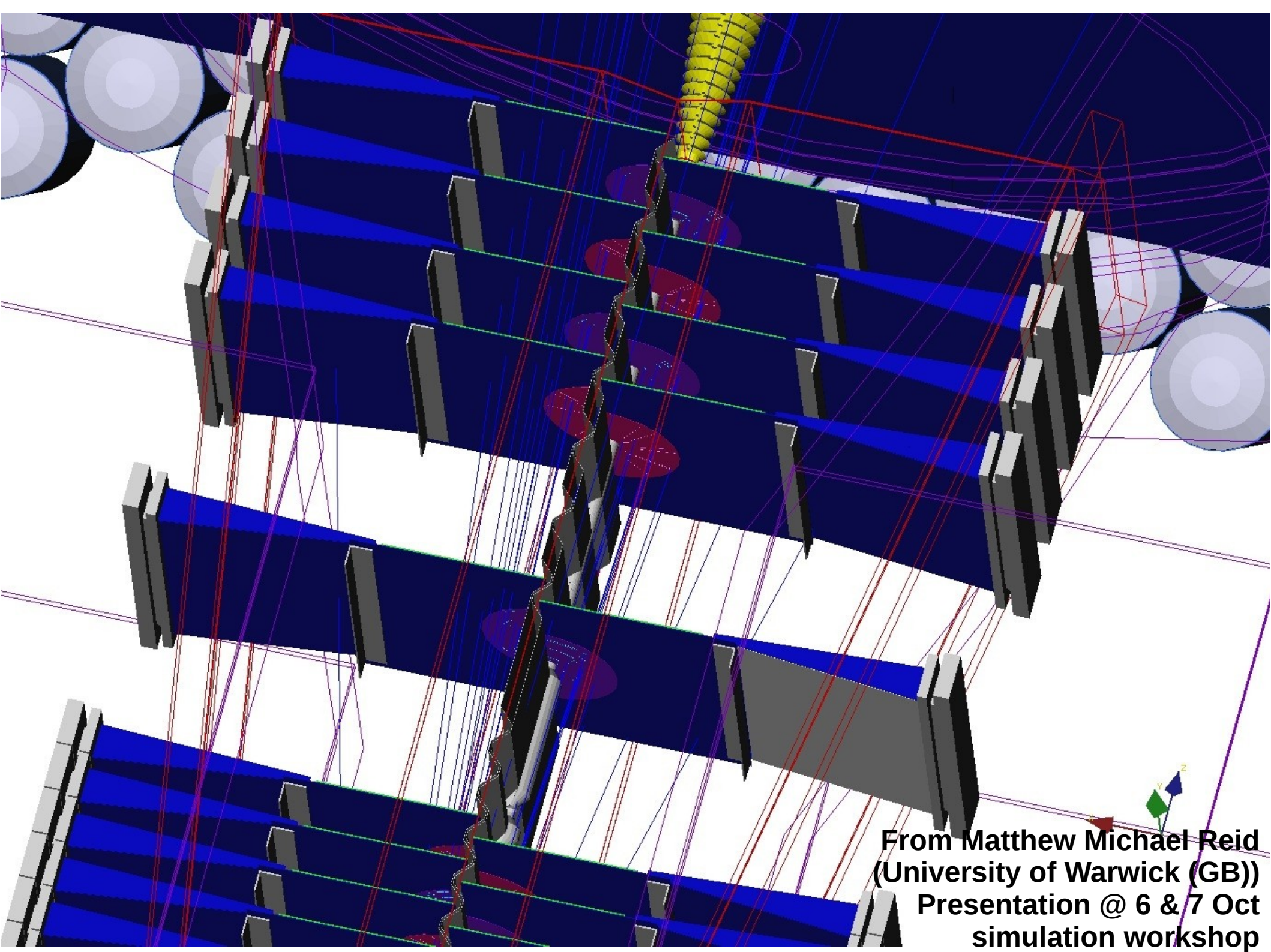
- Originators: (LHCb, Gloria Corti) – March 2010
- Responsible(s) : M. Kossov / G. Folger
 - Identified significant differences between charged Kaon cross sections and PDG values. This has impact on LHCb measurements.
 - Physics lists QGSP_BERT still utilises Gheisha cross-section for K+/K-
- Request
 - hadronic physics builder with well-modeled Kaon interactions
- Since 9.4-beta (June 2010):
 - Physics builders and QGSP_BERT_CHIPS physics list provided in 9.4 beta
 - Kaon cross-sections use revised CHIPS parameterisations
 - Kaon interactions unchanged Bertini <9.9 GeV, $9.5 < \text{LEP} < 25$, QGSP > 12
 - Note: K⁰/K^{0bar} oscillations not modeled
- Since March 2011:
 - Can now use Kaon cross-section in FTF, no longer need LEP.
 - New K⁺/K⁻ cross-section using Glauber approach (V. Grichine).
- Status from today:
 - In 9.5, physics lists free from LEP exist
 - Several models can now handle K⁺/K⁻ at medium energies.
 - **Open**

2901: Lateral displacement in large volume

- Originator: G. Corti (LHCb)
- Issue
 - Bad correlation between displacement and angular deviation when delta rays are turned off (in large volume)
 - Due to displacement lost on steps ending on boundary
 - Proposal to use EM-Opt3 incurs too large CPU cost
- Status (Mar 2011)
 - New limitation for MSC in “default” EM-Opt0
 - Default value = 20 X0
- Status from today:
 - Above solution seems to fix the issue for muons (G4 team).
 - Other particles less affected as higher probability to interact.
 - Waiting for LHCb to confirm.
 - **Open.**

2902: Displacement in thin volumes

- Originator: S. Miglioranzi (LHCb)
- Issue
 - Displacement lost for steps in thin vol. (Si layers)
 - Need to recover displacement for all charged particles (not just e-, as in EM opt 3)
 - Need to avoid extra CPU cost.
- Status (March 2011)
 - Agree to provide a customized physics List based on EM Option-0, which limiting all charged particles' steps – in order to
 - For use in production,
 - Easiest is to impose step-limit by volume. Else
 - Further development to configure by region will be needed.
- Status from today:
 - Suspicion since simulation workshop (Oct 2011) is that problem might be related to the complicated shape of the RF-foil, in front of the VELO, to be implemented in detail.
 - **Open.**



From Matthew Michael Reid
(University of Warwick (GB))
Presentation @ 6 & 7 Oct
simulation workshop

Requirements recently closed

2702: Interfaces of Physics Builders

- Originators: (LHCb, Gloria Corti) – March 2010
- Responsible(s): V. Ivantchenko
 - Need to allow the full set of G4 constructors arguments to be passed.
 - Context: LHCb customises physics list, using physics builders as components.
- Requests
 - rationalize the constructors of the PL builders
 - Make regular the order and types of arguments
 - create an extender of G4VPhysicsConstructor to allow the setting of class arbitrary parameters.
- Status (March 2011)
 - Additional interface of physics builders were created and made in 9.4-beta (Jun 2010) and are included in 9.4.
 - Propose to close
- Status from today:
 - **Closed**

2903: Stability of Energy Deposition

- Reporter: S. Miglioranzi (LHCb)
- Issue
 - Find difference in energy scale between G4 7.1, 9.1 and 9.2
 - 9.2 agrees with 7.1, but 9.1 was different
 - Diff was 15% (ECAL) – 30% (ECAL)
- Status (March 2011)
 - G4 team cannot reproduce this result
 - Energy scale is stable from 7.1 to 9.1 (EMV) to 9.3(EMV)
 - G. Corti: It is difficult to reconstruct what was done for 9.1 studies, variations will be monitored carefully.
- Status:
 - **Closed**