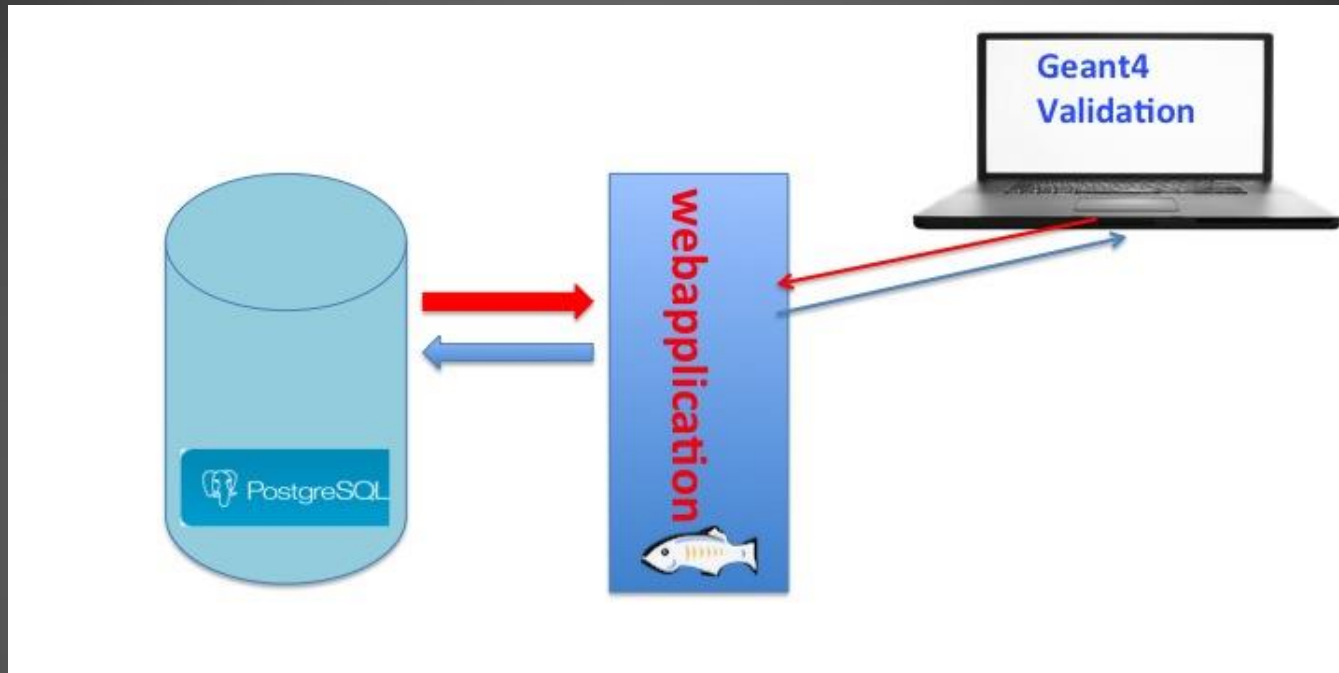


Hadronic physics validation tool, Status and Plans

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Sep 23rd 2013

Introduction



Central repository (Database) of tests, where a test is a comparison of experimental data with simulation.

Test are stored as plots with metadata in the data base. The web application allows to View the tests.

Providing/uploading the test results is responsibility of the model developers.

Project info

Web page:

<http://g4validation.fnal.gov:8080/G4ValidationWebApp/>

Code in SVN

<https://svnweb.cern.ch/cern/wsvn/g4validation/trunk/G4ValidationWebApp/>

Validation Taskforce TWIKI/Task list:

<https://twiki.cern.ch/twiki/bin/view/Geant4/PhysicsValidationTaskForce>

<https://twiki.cern.ch/twiki/bin/view/Geant4/ValidationTasks>

<https://svnweb.cern.ch/trac/g4validation/>

Production environment

- **web Application server on VM on Fermi Cloud, postgresql database operated by fermilab database group.**

<http://g4validation.fnal.gov:8080/G4ValidationWebApp/>

- **Up to date: latest java/java libraries, glassfish web application server, database schema identical to development environment.**
- **New features include:**
 - **Multiple (single) File Upload web application. Help available to guide you through the process.**
 - **Release highlights for upcoming Geant4 release (Julia)**
 - **Only tests explicitly declared public can be viewed without authentication.**
 - **Expert login to view, edit, delete tests. (Makes use of functionality provided by glassfish web application server).**

Geant4 Physics Validation - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Geant4 Physics Validation

g4validation.fnal.gov:8080/G4ValidationWebApp/

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Geant 4

Home > Results & Publications > Physics Validation and Verification

Home Validation Overview Release Highlights Electromagnetic Hadronic LHC-feedback Expert

Welcome to the Geant4 Validation Repository
Please make your selection from the menu on the top

Database statistics

Number of test setups	21
Number of test results (public and internal)	18128

List of Tests

Name	Description	Working Group
ATLAS	shower characteristics of ATLAS Calorimeters	LHC-feedback
CMS	shower characteristics of CMS Calorimeters	LHC-feedback
HadrIon	Test of Physics Lists (thick targets, ion beams)	hadronic
HadrXS	Test of Physics Lists (cross sections)	hadronic
HadrCap	is an analogous to Hadr00, with advanced features.	hadronic
IAEA	IAEA Benchmark of Nuclear Spallation Models	hadronic
Ndata	Test concerning developments of new nXS, it is calling HP XS as well as HPW XS.	hadronic
Testfragm	Test of hadronic generators (thin targets, ion beams)	hadronic
atlasbar	Test of ALTAS barrel type em calorimeter, determines response, resolution, and CPU performance	electromagnetic
placeholder	Dummy testdes	hadronic
simplifiedCalo	Test of Shower shapes using selected simplified calorimeter setups.	hadronic
test19	high energy test, provides comparison with NA61 (31GeV/c proton beam) and NA49 (158GeV/c proton beam) data sets.	hadronic
test22	Testing of the FTF model and comparison with experimental data for a wide energy region	hadronic
test30	Test of hadronic generators of inelastic processes	hadronic
test35	Test of hadronic generators of inelastic processes, based on results of HARP collaboration, Experiment PS214 at CERN.	hadronic
test37	Test against Sandia data, electron beam in semi-infinite media.	electromagnetic
test41	Comparison with MUSCAT experiment for multiple scattering validation	electromagnetic
test45	Test of hadronic generators of inelastic processes on thick targets.	hadronic
test47	Intermediate energy validation is done by comparing Monte Carlo predictions vs experimental data.	hadronic
test48	Stopping particle test Monte Carlo predictions are compared to experimental data.	hadronic
test75	test of gamma-nuclear interactions	hadronic

Example: Uploading multiple tests

First login to expert page then select Upload Tests (multiple)

The screenshot shows the Geant4 website interface. At the top, there is a navigation bar with the Geant4 logo and links for Login, Download, User Forum, Gallery, Site Index, and Contact Us. Below this is a search bar labeled "Search Geant4". The main navigation menu includes Home, Validation Overview, Electromagnetic, Hadronic, LHC-feedback, and Expert. The Expert section is currently selected. A welcome message reads: "Welcome to the Geant4 Validation Repository. Please make your selection from the menu on the top." Below this is a "Database statistics" table:

Database statistics	
Number of test setups	15
Number of test results	7549
Registered users	8

At the bottom of the page, there are links for Applications, User Support, Results & Publications, Collaboration, and Site Map. A footer section contains "Contact Webmaster" and "Current Time: Mon Oct 29 11:27:08 CDT 2012".

An "Authentication Required" dialog box is overlaid on the bottom right. It contains the following text: "A username and password are being requested by http://triathlon.fnal.gov:8080. The site says: 'Expert Section'". The "User Name" field is filled with "G4Expert" and the "Password" field is filled with 12 dots. There are "Cancel" and "OK" buttons at the bottom right of the dialog.

Example: Uploading multiple tests (cont.)

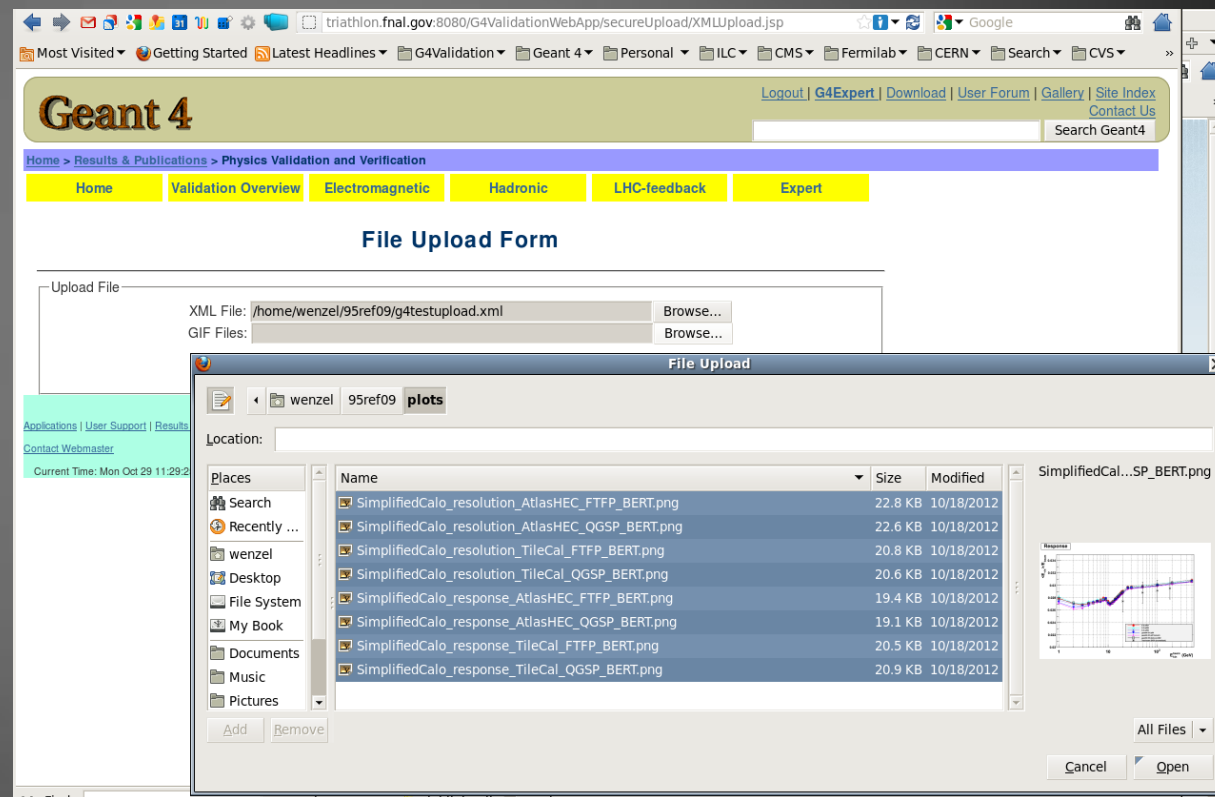
Press Help button for:

- detailed instructions
- Example xml file describing the multiple file upload the

The screenshot shows a web browser window displaying the 'G4Validation Upload Page - Select Test' in Mozilla Firefox. The browser's address bar shows the URL 'g4devel.fnal.gov:8080/G4ValidationWebApp/secureUpload/XMLUpload.jsp'. The page header features the 'Geant4' logo and navigation links for 'Logout', 'G4Expert', and 'Download'. Below the header is a navigation menu with buttons for 'Home', 'Validation Overview', 'Release Highlights', 'Electromagnetic', 'Hadronic', 'LHC-feedback', and 'Expert'. The main content area is titled 'File Upload Form. For help click' and contains a 'HELP' button with a red arrow pointing to it. The form includes fields for 'XML File:' and 'GIF Files:', each with a 'Browse...' button, and an 'Upload File' button at the bottom. The footer contains links for 'Applications', 'User Support', 'Results & Publications', 'Collaboration', and 'Site Map', along with a 'Contact Webmaster' link and the current time: 'Mon Nov 26 04:43:10 CST 2012'.

Example: Uploading multiple tests (cont.)

- Select the xml file describing the tests
- Select all the images that need to be uploaded



Example: Uploading multiple tests (cont.)

This is what a successful upload should look like. Problems usually arise from malformed xml files which can be avoided by:

- Use of xml enabled editor
- Templates for different tests (usually only geant 4 version changes for a given test)

triathlon.fnal.gov:8080/G4ValidationWebApp/Servlets/XMLUploadServlet

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Geant 4 Validation File upload

Number of Files to be uploaded: 8

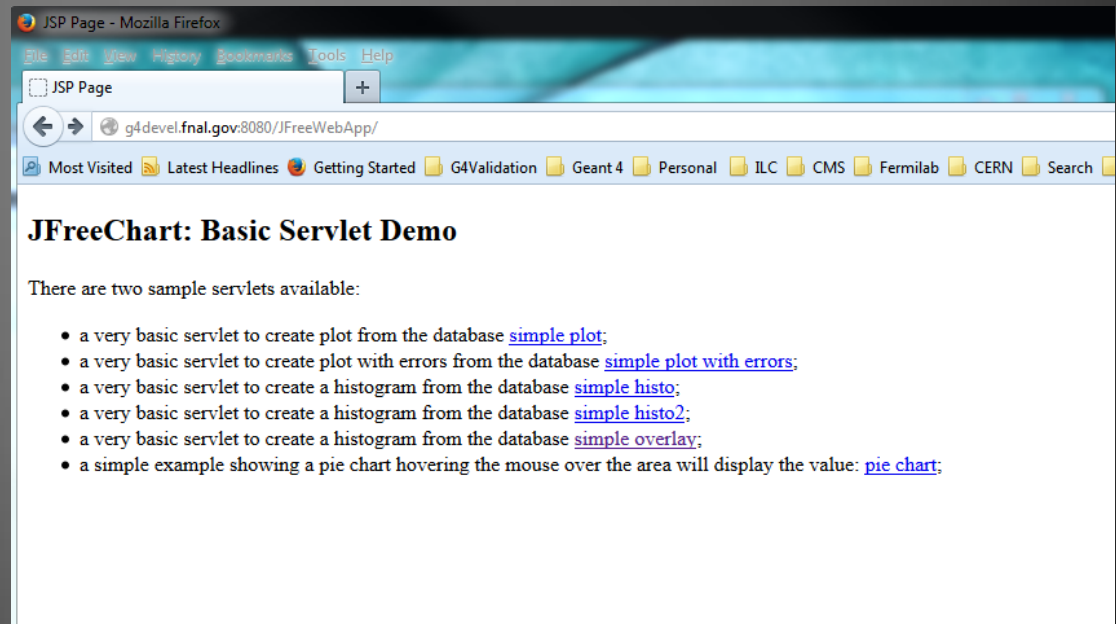
Name of the Test:	simplifiedCalo
Geant4 Version:	geant4-9.5-test8
Observable:	Response
Reaction:	pi- + Cu/LAr Response (QGSP_BERT)
Absorber	Copper
Active	Liquid Argon
Particle	pi-
PhysicsList	QGSP_BERT
Data Source	http://sftweb.cern.ch/validation/node/97
Score:	passed
Type:	expert

Name of the Test:	simplifiedCalo
Geant4 Version:	geant4-9.5-test8
Observable:	Resolution
Reaction:	pi- + Cu/LAr Resolution (QGSP_BERT)
Absorber	Copper
Active	Liquid Argon
Particle	pi-
PhysicsList	QGSP_BERT
Data Source	http://sftweb.cern.ch/validation/node/99
Score:	passed
Type:	expert

Find: gav Previous Next Highlight all Match case

Development/Test environment

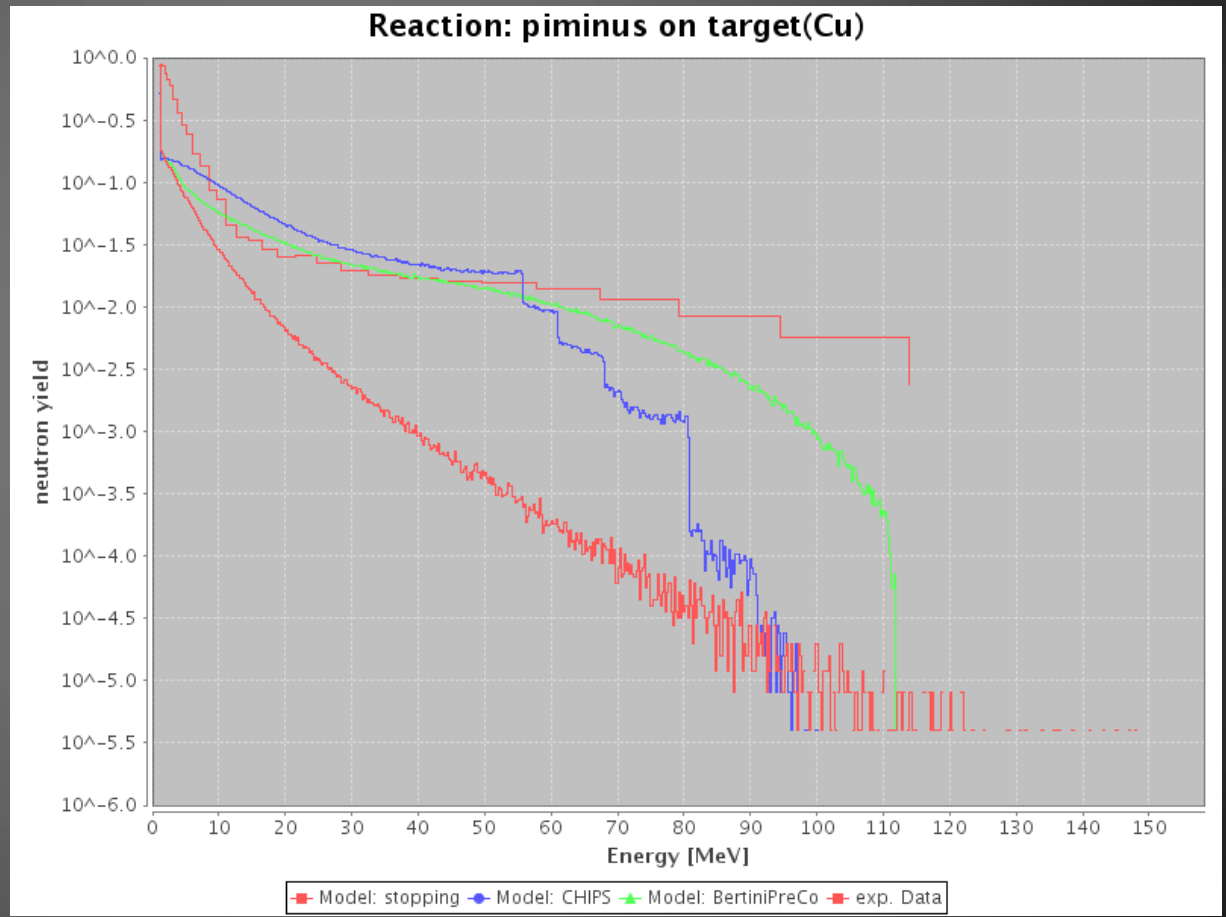
- **Development web Application server on Fermi Cloud/ development data base, used to test features/configurations then will be rolled over to production server .**
<http://g4devel.fnal.gov:8080/G4ValidationWebApp/>
- **Also hosts prototype 'plots on the fly' web application:** <http://g4devel.fnal.gov:8080/JFreeWebApp>



Graphs on the fly prototype

- Data base schema extended to store raw experimental and raw simulation data (histograms) in the data base.
- Select → plot and overlay (comparable) data, using the jfreechart graphics package.
- Example test48 data provided by Julia:
 - Reaction: pi on Target (Cu, Al, O, N, C, Pb, Ta)
 - Observable: neutron yield
 - Geant 4 version: (need to look up)
 - Models: stopping, Chips, Bertini PreCo
 - Experimental data: Madey et al.

Graphs on the fly example created by prototype web application



What's next

- Work and extend the existing task list.
- Develop prototype web application that allows to select experimental and simulation data and then overlays the data in a plot.
- Import all the experimental data files used by various tests.
- Evaluate web frameworks like PrimeFaces to provide scalability and modern look and feel.
- Actually it is a fun project for e.g. computer science students to learn about web application frameworks, javaEE etc.