

Hadronic Validation Plans

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Geant4 Collaboration Meeting
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Outline

- Continuing efforts (managing the workload)
- New Initiatives (things we're about to start or have started)
- The Future (things we're still thinking about)

Continuing Efforts

- See first talk this session
- Number of validation tests continue to grow
 - 7301 test results as of September 2nd
- This is a very good thing, but:
 - it's a big effort to set up each test
 - only one or two people are able to scan the results at each release
- Need to automate the system
 - when completed, new unified validation system will help
 - however, still need regular operators and evaluators
 - hadronic validation shifts?

Unified Validation Website

- Geant4->Results & Publications->Validation & Testing
->Hadronic Validation Web Pages->New Validation Framework

The screenshot shows the Geant4 Validation Website interface. At the top left is the 'Geant 4' logo. To the right are links for 'Login', 'Download', 'User Forum', 'Gallery', 'Site Index', and 'Contact Us'. Below these is a search bar with the text 'Search Geant4'. A blue breadcrumb trail reads 'Home > Results & Publications > Physics Validation and Verification'. A yellow navigation menu contains buttons for 'Home', 'Validation Overview', 'Electromagnetic', 'Hadronic', 'LHC-feedback', and 'Expert'. The main content area features a welcome message: 'Welcome to the Geant4 Validation Repository. Please make your selection from the menu on the top'. Below this is a 'Database statistics' table with the following data:

Database statistics	
Number of test setups	15
Number of test results	7301
Registered users	8

At the bottom of the page, there are links for 'Applications', 'User Support', 'Results & Publications', 'Collaboration', and 'Site Map'. A 'Contact Webmaster' link is also present. The current time is displayed as 'Current Time: Fri Sep 02 00:56:55 CEST 2011'.

Unified Validation Website

- Click on “Hadronic”, then test30 (for example)

Geant 4

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[Home](#) > [Results & Publications](#) > [Physics Validation and Verification](#)

Home

Validation Overview

Electromagnetic

Hadronic

LHC-feedback

Expert

Name of the Test:	test30
Responsible:	V. Ivanchenko
Description:	Test of hadronic generators of inelastic processes

Geant4 Version:	9.3.ref06
Observable:	dsigma/dE dOmega
Reaction:	n + Pb ->n+X

Test Conditions	
Name	Description
last-modified	2011-07-08 16:09:35 CEST
Target	Lead
Particle	n
Energy	65 MeV
Model	Bertini (Bert)
Model	Binary Cascade (BIC)
Angle	20. deg
Angle	28. deg
y-scale	linear
Score:	passed
Type:	expert

Results

$n + Pb \rightarrow n + X, E = 65 \text{ MeV}; \theta = 20^\circ$

$\theta = 28^\circ$

List of hadronic Tests

Hadrcap

Ndata

Test30iaea

placeholder

simplifiedCalo

test30

9.3.ref02

9.3.ref03

9.3.ref04

9.3.ref05

9.3.ref06

test35

test45

test47

test48

New Initiatives

- Medium-high energy validation (MIPPS)
 - see second talk this session
 - new data, new energy region (58, 120 GeV/c)
 - good test of string models, and CHIPS
- High energy validation (NA61)
 - hadron production from p-A and A-A fixed target collisions
 - 13 to 158 AGeV beams
- Expand existing high energy validation
 - currently have comparisons at 250, 320, 400 GeV/c (CERN NA22, FNAL E592)

New Initiatives

- Cross section validation
 - Historically our focus has been on the validation of models and processes
 - Little effort on direct validation of cross section data sets
 - Challenges:
 - many cross section data sets for different particles, energies
 - some cross sections buried within models, with different formats
 - despite our best efforts, many cross sections remain scattered throughout hadronic code
 - Have begun developing explicit tests
 - Ion-ion cross sections
 - CHIPS cross sections

New Initiatives

- Data-driven model validation for high precision neutron models and charged particles (CIEMAT/SLAC)
 - see talks in parallel session 2A
- Radioactive decay
 - validation of beta decay shapes
 - gamma lines
- Kaon physics
 - cross sections and models have been available for a while now
 - just starting to compare to LHCb multiplicity data
 - re-run old kaon validations (now that Bertini E/p conservation is good)

The Future

- Integration of existing tests into validation framework
 - Simplified calorimeter
 - FTF tests
- New Data from experiments
 - Calice
 - sporadic comparisons in the past
 - would like it to be more regular
 - Anti-proton and anti-ion validation
 - when anti-hadron models are complete
 - and more data from Alice
 - LHC data
 - have no idea what to expect when TeV data arrives
 - are our string models good enough?

The Future

- Thick target tests (several interaction lengths)
 - Nearly all our tests compare to thin-target data
 - best test of single interactions
 - more sensitive to model details
 - Comparison with thick target data will improve our understanding of combined processes and physics lists
 - currently have 1 test at 67 GeV/c (IHEP data), using QGSP physics list
 - Calorimeter tests would fall into thick target category