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)
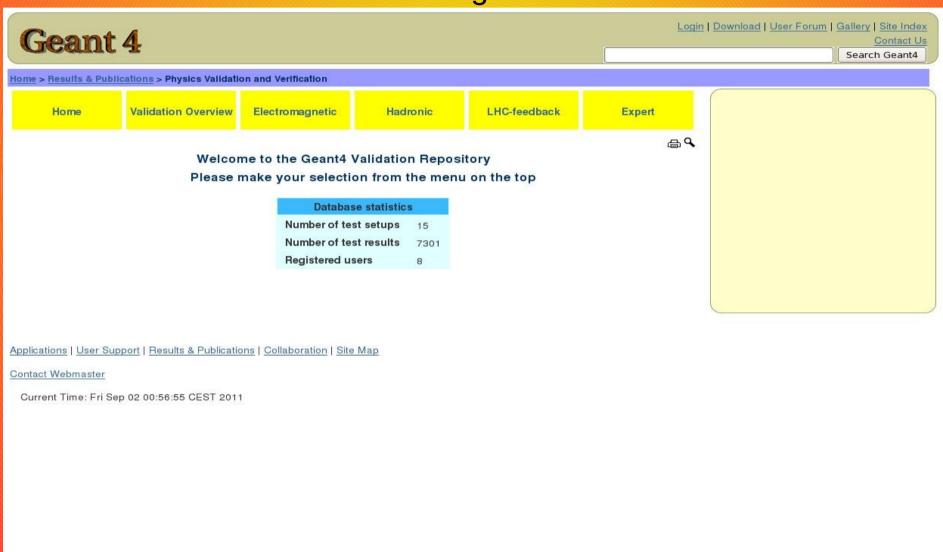
- The Future (things we're still thinking about)

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
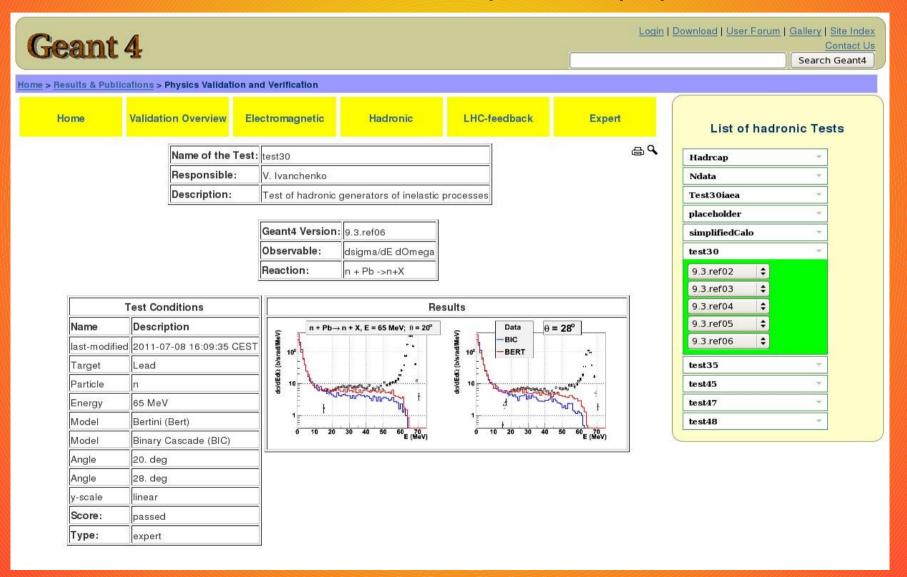
  - hadronic validation shifts?

Unified Validation Website

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

Unified Validation Website

- Click on "Hadronic", then test30 (for example)

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)

8

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