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Validation of the GEANT4 Bertini Cascade model and data analysis using the Parallel ROOT Facility on a Linux cluster

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Validation of hadronic physics processes of the Geant4 simulation toolkit is a very important task to ensure adequate physics results for the experiments being built at the Large Hadron Collider. We report on simulation results obtained using the Geant4 Bertini cascade double-differential production cross-sections for various target materials and incident hadron kinetic energies between 0.1-10 GeV [1, 2].

The cross-section benchmark study in this work has been performed using a Linux cluster set up with the Red Hat Linux based NPACI Rocks Cluster Distribution. For analysis of the validation data we have used the Parallel ROOT Facility (PROOF). PROOF has been designed for setting up a parallel data analysis environment in an inhomogeneous computing environment. Here we use a homogeneous Rocks cluster and automatic class generation for PROOF event data-analysis [3].

[1] J. Beringer, "(p, xn) Production Cross Sections: A benchmak Study for the Validation of Hadronic Physics Simulation at LHC", CERN-LCGAPP-2003-18.

[2] A. Heikkinen, N. Stepanov, and J.P. Wellisch, "Bertini intra-nuclear cascade implementation in Geant4", arXiv: nucl-th/0306008

[3] F. Rademakers, M. Goto, P. Canal, R. Brun, "ROOT Status and Future Developments", arXiv: cs.SE/0306078

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