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Recent Developments and Validation of Geant4 Hadronic Physics

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In the past year several improvements in Geant4 hadronic physics code have been made, both for HEP and nuclear physics applications. We discuss the implications of these changes for physics simulation performance and user code. In this context several of the most-used codes will be covered briefly. These include the Fritiof (FTF) parton string model which has been extended to include antinucleon and antinucleus interactions with nuclei, the Bertini-style cascade with its improved CPU performance and extension to include photon interactions, and the precompound and deexcitation models. We have recently released new models and databases for low energy neutrons, and the radioactive decay process has been improved with the addition of forbidden beta decays and better gamma spectra following internal conversion.

As new and improved models become available, the number of tests and comparisons to data has increased. One of these is a validation of the parton string models against data from the MIPP experiment, which covers the largely untested range of 50 to 100 GeV. At the other extreme, a new stopped hadron validation will cover pions, kaons and antiprotons. These, and the ongoing simplified calorimeter studies, will be discussed briefly. We also discuss the increasing number of regularly performed validations, the demands they place on both software and users, and the automated validation system being developed to address them.

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