The Binary Cascade

Thursday 30 September 2004 10:00 (1 minute)

Geant4 is a toolkit for the simulation of the passage of particles through matter. Amongst its applications are hadronic calorimeters of LHC detectors and simulation of radiation environments. For these types of simulation, a good description of secondaries generated by inelastic interactions of primary nucleons and pions is particularly important.

The Geant4 Binary Cascade is a hybrid between a classical intra-nuclear cascade and a QMD model for the simulation of inelastic scattering of pions, protons and neutrons, and light ions of intermediate energies off nuclei. The nucleus is modeled by individual nucleons bound in the nuclear potential. Binary collisions of projectiles or projectile constituants and secondaries with single nucleons, resonance production, and decay are simulated according to measured, parametrised or calculated cross sections. Pauli's exclusion principle, i.e. blocking of interactions due to Fermi statistics, reduces the free cross section to an effective intra-nuclear cross section. Secondary particles are allowed to further interact with remaining nucleons.

We will describe the modeling, and give an overview of the components of the model, their object oriented design, and implementation.

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