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Adding Kaons to the Bertini Cascade Model

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A version of the Bertini cascade model for hadronic interactions is part of the Geant4 toolkit, and may be used to simulate pion-, proton-, and neutron-induced reactions in nuclei. It is typically valid for incident energies of 10 GeV and below, making it especially useful for the simulation of hadronic calorimeters. In order to generate the intra-nuclear cascade, the code depends on tabulations of exclusive channel cross section data, parameterized angular distributions and phase-space generation of multi-particle final states. To provide a more detailed treatment of hadronic calorimetry, and kaon interactions in general, this model is being extended to include incident kaons up to an energy of 15 GeV. Exclusive channel cross sections, up to and including six-body final states, will be included for K+, K-, K0, K0bar, lambda, sigma+, sigma0, sigma-, xi0 and xi-. K+nucleon and K-nucleon cross sections are taken from various cross section catalogs, while most of the cross sections for incident K0, K0bar and hyperons are estimated from isospin and strangeness considerations. Because there is little data for incident hyperon cross sections, use of the extended model will be restricted to incident K+, K-, K0S and K0L. Hyperon cross sections are included only to handle the secondary interactions of hyperons created in the intra-nuclear cascade.

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