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Ion transport simulation using Geant4 hadronic physics

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The transportation of ions in matter is subject of much interest in not only high-energy ion-ion collider experiments such as RHIC and LHC but also many other field of science, engineering and medical applications. Geant4 is a tool kit for simulation of passage of particles through matter and its OO designs makes it easy to extend its capability for ion transports. To simulate ions interaction, we had to develop two major functionalities to Geant4. One is cross section calculators and the other is final stage generators for ion-ion interactions. For cross sections calculator, several empirical cross section formulas for the total reaction cross section of ion-ion interactions were investigated. And for final stage generator, binary cascade and quark-gluon string model of Geant4 were improved so that ions reaction with matter can also be calculated. Having successfully developed both functionalities, Geant4 can be applied to ion transportation problems. In the presentation we will explain cross section and final stage generator in detail and show comparisons with experimental data.

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