
Geant4 application for simulating the propagation of cosmic rays through the Earth's magnetosphere

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Abstract

We have developed a Geant4 application to simulate the propagation of cosmic rays through the Earth's magnetosphere. The application computes the motion of charged particles through advanced magnetospheric magnetic field models such as the Tsyganenko 2001 model. It allows to determine cosmic ray cutoff rigidities and asymptotic directions of incidence for user-defined observing positions, directions, and times. By using the new generation of Tsyganenko models, we can analyse the variation of cutoff rigidities and asymptotic directions during magnetic storms as function of the Dst index and of the solar wind dynamic pressure. The paper describes the application, in particular its visualisation potential, and simulation results.

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