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PLANETOCOSMICS : a GEANT4 based computer code for simulating the interaction of space radiations with planets

L. Desorgher (1), E. O. Flückiger (1), M. Gurtner (2)
(1) Physikalisches Institut, University of Bern, (2) University of Wuppertal

The study of the impact of cosmic rays and other space radiations on planets is of great importance for different fields of planetary science. A precise knowledge of the radiation environment of a specific planet is also crucial to assess the radiation risk of space missions. In this context complex computer codes are needed to model the interaction of energetic particles with planets. The PLANETOCOSMICS code based on GEANT4, developed within an ESA/ESTEC contract, allows to compute the electromagnetic and hadronic interaction of energetic particles ($<$1TeV) with the Earth, Mars, and Mercury. We are actually extending the code capabilities for treating the case of Jupiter and Europa. For all planets different models of atmosphere, magnetosphere and soil can be selected. The main applications of the code are : i) the computation of the propagation of charged particles in the planet magnetosphere; ii) the computation of the flux of particles resulting from the interaction of cosmic rays with the planet atmosphere and soil at user defined altitudes, iii) the computation of the energy deposited by cosmic ray showers in the planet's atmosphere and soil. PLANETOCOSMICS has been been developed such that the implementation of new atmospheric and magnetic field models as well as the extension to other planetary environments is rather simple. The code can be downloaded from the url http://cosray.unibe.ch/˜laurent/planetocosmics/. We will present various simulation results for the Earth, Mars and Mercury. First results for the case of Jupiter and Europa will also be presented.